

JPRS-TND-88-017  
21 SEPTEMBER 1988



**FOREIGN  
BROADCAST  
INFORMATION  
SERVICE**

---

# ***JPRS Report***

# **Nuclear Developments**

---

# Nuclear Developments

JPRS-TND-88-017

## CONTENTS

21 SEPTEMBER 1988

### SUB-SAHARAN AFRICA

#### SOUTH AFRICA

Pik Botha's Claim of Nuclear Capability Assessed [Patrick Lawrence; Johannesburg <i>THE STAR</i> 15 Aug 88]	1
Implications for NPT Affiliation [David Braun; Johannesburg <i>THE STAR</i> 18 Aug 88]	1
Country's Nuclear Capability Discussed [Johannesburg <i>FINANCIAL MAIL</i> 19 Aug 88]	3

### CANADA

Bigger Emergency Zones Urged Around Ontario Nuclear Stations [Christie McLaren; Toronto <i>THE GLOBE AND MAIL</i> 8 Aug 88]	5
Commons Committee Urges Ottawa To Boost Nuclear Support [John Kohut; Toronto <i>THE GLOBE AND MAIL</i> 26 Aug 88]	6

### CHINA

Head of Nuclear Society on Nuclear Development [Beijing <i>RENMIN RIBAO OVERSEAS EDITION</i> 9 Sep 88]	7
Nuclear Mistakes Hinder China's Progress [S Y Wai; Hong Kong <i>HONGKONG STANDARD</i> 18 Aug 88]	9
Pictorial Report Depicts Progress in 1 Day Project [Hong Kong <i>HONGKONG STANDARD</i> 30 Jul 88]	10
Developer To Draft Panel on Daya Bay [Andy Ho; Hong Kong <i>SOUTH CHINA MORNING POST</i> 2 Aug 88]	10

### EAST ASIA

#### HONG KONG

Xinhua Role Planned for Daya Safety Panel [Frank Choi; Hong Kong <i>HONGKONG STANDARD</i> 3 Aug 88]	12
Three Hong Kong Experts To Sit on Daya Bay Panel [Andy Ho; Hong Kong <i>SOUTH CHINA MORNING POST</i> 6 Aug 88]	12
Chairman Rises to Defence of Daya Bay Panel [Andy Ho; Hong Kong <i>SOUTH CHINA MORNING POST</i> 9 Aug 88]	13
Consultative Committee Expects Dual Role [Hong Kong <i>HONGKONG STANDARD</i> 11 Aug 88]	14

### EAST EUROPE

#### ROMANIA

Status of Nuclear Power Plants Discussed [Paul Emil Rascu; <i>ENERGETICA</i> Feb 88]	15
--	----

### LATIN AMERICA

#### ARGENTINA

Alfonsin, CNEA Head Discuss Plant Financing [Buenos Aires <i>TELAM</i> 24 Aug 88]	20
Advantages of Building a Nuclear Submarine Cited [Miguel J. Culaciatti; Buenos Aires <i>LA PRENSA</i> 5 Sep 88]	20

## BRAZIL

Mines Minister on Nuclear Program Reorganization [Brasilia Domestic Service 1 Sep 88] .....	21
Further on Nuclear Program Reorganization [Sao Paulo O ESTADO DE SAO PAULO 1 Sep 88] ..	22
Navy Program Not Affected [Brasilia Domestic Service 1 Sep 88] .....	22
Enrichment Process Changed [Joao Borges; Sao Paulo O ESTADO DE SAO PAULO 2 Sep 88] .....	22
CNEN Chief on Policy [Sao Paulo FOLHA DE SAO PAULO 3 Sep 88] .....	23
Eletrobras Head Comments [Rio de Janeiro O GLOBO 3 Sep 88] .....	23
New Nuclear Head on Increased Uranium Production [Sao Paulo O ESTADO DE SAO PAULO 7 Sep 88] .....	24
CNEN To Use Phosphorus Technology in Uranium Enrichment [Rio de Janeiro O GLOBO 1 Aug 88] .....	24
IAEA Official Visits Aramar Nuclear Facility [Rio de Janeiro O GLOBO 21 Jul 88] .....	24
IPEN Seeks Solution to Nuclear Waste Storage [Sao Paulo FOLHA DE SAO PAULO 26 Jul 88] ...	25

## NEAR EAST & SOUTH ASIA

### BANGLADESH

IAEA Team Urges Steps To Insure Safety From Radiation [Shehab Ahmed; THE NEW NATION 13 Jul 88] .....	26
---	----

### INDIA

External Affairs Minister on Pakistan Nuclear Program [Bombay THE TIMES OF INDIA 23 Jul 88] .....	26
External Affairs Minister Asserts Pakistan Has Bomb [Calcutta RAVIVAR 6 Aug 88] .....	27
Parliament Discusses Pakistan Nuclear Development [New Delhi PATRIOT 29 Jul 88] .....	28
Soviets To Help Set Up 2 Nuclear Reactors [Delhi Domestic Service 31 Aug 88] .....	28
AEC Chairman on Plans for More Nuclear Power Plants [L. K. Sharma; THE TIMES OF INDIA 19 Jul 88] .....	29
AEC Thorium Plant Scored for Waste Disposal Methods [Bombay THE TIMES OF INDIA 22 Jul 88] .....	30
AEC Chairman Discusses Nuclear Developments in India [New Delhi PATRIOT 24 Jul 88] .....	30

## WEST EUROPE

### TURKEY

Tea Pulled From Market for Excess Radiation [Istanbul TERCUMAN 5 Jul 88] .....	32
--	----

### UNITED KINGDOM

Government Termed Optimistic on Radiation Defense [John Grigsby; London THE DAILY TELEGRAPH 5 Aug 88] .....	32
Power Systems Investigated After Alert on Magnox Reactor [Roger Highfield; London THE DAILY TELEGRAPH 5 Sep 88] .....	32

## SOUTH AFRICA

**Pik Botha's Claim of Nuclear Capability Assessed**  
51000019 Johannesburg *THE STAR* in English  
15 Aug 88 p 13

[Article by Patrick Lawrence: "Pik's Diplomatic Thrust Causing Fission in International Nuclear Circles"]

[Text] The South African Foreign Minister, Mr Pik Botha, left an unanswered question in his trail as he left Vienna at the weekend after holding talks with the three guarantor countries—The United States, Britain and the Soviet Union—Of the Nuclear Non-Proliferation Treaty.

The question was: Why did he affirm that South Africa is capable of producing nuclear weapons.

One reason suggested by observers is that he may have wanted to emphasise the danger of expelling South Africa from the International Atomic Energy Agency and thus forestall any further moves in that direction.

The threat of expulsion from the IAEA about a year ago was a key factor in causing a change in Pretoria's stand on the Nuclear Non-Proliferation Treaty.

During the premiership of Mr B. J. Vorster from 1966 to 1978, and for most of the time that Mr P. W. Botha has been at the helm, first as premier and then as president, South Africa adamantly refused to sign the treaty.

There were several reasons for its attitude, according to Professor John Barratt of the SA Institute of International Affairs.

It shared the belief of some smaller countries with a nuclear capability that the treaty discriminated in favour of the superpowers by allowing them to retain their nuclear weaponry, and it feared that inspection of its nuclear plants could lead to industrial espionage and was particularly anxious to keep prying eyes off its "unique" technique of uranium enrichment.

A third reason was suspected by some observers. To quote Professor Robert Rotberg of the United States: "The white minority government has long wanted ostentatiously to reserve the right to develop nuclear weapons as a last defence against external pressure to accede to black rule."

But in September last year President Botha changed tack, announcing that South Africa would be prepared to reconsider its position. His shift in policy coincided with, and was almost certainly prompted by, threats to expel South Africa from the IAEA.

The main pressure came from black African countries and a factor which caused them to call off their expulsion campaign was the belief and fear that South Africa might

have developed a nuclear bomb. Seen in that light, Mr Pik Botha's statement in Vienna makes political sense, Professor Barratt said yesterday.

If South Africa still has reservations about signing the Nuclear Non-Proliferation Treaty—Mr Botha expressed concern over whether the provisions of the treaty would be applied fairly to South Africa if it became a signatory—South Africa values highly its membership of the IAEA.

The IAEA is one of the last international bodies to which South Africa still belongs and, as Professor Barratt pointed out, it serves as a valuable conduit for the exchange of scientific and technological information.

Speculation that South Africa has nuclear weapons often works to the advantage of South Africa and Mr Botha may have been deliberately fuelling it. As Professor Mike Hough of the Pretoria-based Institute of Strategic Studies has said: "Rumours that South African is already in possession of nuclear weapons may provide a measure of deterrence, albeit limited, without the political disadvantage of open possession of these weapons."

The head of South Africa's National Intelligence Service, Dr Neil Barnard, is on record as favouring development of nuclear weapons.

"The acquisition of nuclear weapons will not necessarily isolate South Africa any further," he said, adding: "Without a strong power base all modern diplomacy is doomed to failure."

### Implications for NPT Affiliation

51000019 Johannesburg *THE STAR* in English  
18 Aug 88 p 16

[Article by David Braun: "Botha's Bombshell"]

[Text] Does South Africa have the bomb? This question has been posed for many years both at home and abroad.

Controversy in British and South African newspapers over foreign Minister Mr Pik Botha's remark that South Africa has the capability to make a nuclear explosive device has raised the question.

It is not entirely clear why Mr Botha's remark has raised such a storm, as nuclear experts the world over have for a long time known or strongly suspected that South Africa has such a capability.

This is precisely why Mr Botha and his colleague, Technology Minister Mr Danie Steyn, were in Vienna negotiating South Africa's possible signing of the Nuclear Non-Proliferation Treaty (NPT) last week.



Had there not been such international concern for years that South Africa could misuse its nuclear capability, major countries would not have been so anxious that Pretoria put its signature to the NPT.

South Africa stands to gain by signing the agreement, provided this country is treated in exactly the same way as any other signatory.

This means it must be guaranteed the right to take part in the international exchange of nuclear technologies, the sale and purchase of uranium, and access to nuclear plants all over the world.

In terms of Article IV of the NPT, all parties have the inalienable right to develop research, production and use of nuclear energy for peaceful purposes without discrimination.

All the parties to the treaty undertake to facilitate and have the right to participate in the fullest possible exchange of equipment, materials and scientific and technological information for the peaceful use of nuclear energy.

Parties to the treaty in a position to so do must also cooperate in contributing alone, or together with other states or international organisations, to the further development of applications of nuclear energy for peaceful purposes, especially in the territories of non-nuclear-weapons states that are party to the treaty, with due consideration for the needs of the developing areas of the world.

South Africa's obligations as a signatory would be to undertake not to manufacture nuclear weapons while at the same time it must open its own nuclear installations to international inspection. South Africa must also share its own nuclear expertise with others.

The problem for South Africa is that in terms of sanctions legislation, particularly in America, it might not be able to exercise its full rights in terms of the NPT (such as technology exchanges and the export of uranium).

These are the points on which South Africa has been negotiating behind the scenes with various countries, as well as last week in Vienna.

It is not clear how much progress has been made on securing these guarantees.

The vague statement issued by Mr Botha and Mr Steyn after the Vienna talks merely stated that South Africa had been given a clearer indication of the implications of its signing the NPT.

It also said further negotiations with other countries were necessary before South Africa could make a final decision.

It is difficult to know what guarantees the United States could give South Africa, in view of its position that its congressional laws override international treaties.

A congressional ban on South African trade could, for example, override South Africa's rights in terms of the NPT to buy and sell uranium in America.

There are wider implications for South Africa's becoming party to the NPT.

South Africa is currently the only country in Africa with a nuclear power station. Nuclear energy is very much the energy of the future.

Worldwide fossil fuel resources are expected to start depleting rapidly over the next 30 years, and round about the year 2020 uranium will be a most precious commodity as the cities of the world look for alternative fuels to provide them with energy.

South Africa is a major producer of uranium and its reserves of this precious material are substantial.

To take advantage of this, the country needs to keep abreast of nuclear technology and to remain locked into the world's nuclear network.

South Africa itself must look to building more nuclear power stations over the next 20 to 30 years. The government is already considering a second N-plant, to be located either in the eastern Cape or Natal. Access to the latest power-station technology and components would be essential for this.

On the other side of the coin is the military use of nuclear technology.

South Africa has enjoyed a strategic advantage by keeping the world uncertain about whether or not it has acquired nuclear weapons.

The use of such weapons for South Africa would be very limited, as it definitely does not possess intercontinental delivery systems. Regional targets for short to medium-range nuclear missiles or bombs are hardly likely in view of the massive spillover effects such an attack would have on the South African environment.

The possession of nuclear weapons, however, does not act as a strong deterrent against an all-out conventional attack on South Africa. A desperate government could conceivably use nuclear weapons as a last resort.

South Africa is therefore unlikely to ever reveal whether it has nuclear weapons or not.

That is why Mr Pik Botha gives enigmatic answers to outright questions of this nature. These non-answers in turn cause much excitement as to what Pretoria's game-plan could be with regard to nuclear weapons.

The chances are that Pretoria does not in fact possess nuclear weapons, but that it can produce them at very short notice.

Anyone who owned a nuclear power station could manufacture nuclear weapons, one international expert was quoted as saying this week.

The designs for nuclear weapons have apparently been published in Western scientific journals. It cannot be beyond the wit of South African scientists, with the help of a few friendly countries abroad (which have similar international problems), to develop a weapon.

The international controversy which greeted Mr Botha's confirmation of this capability last week confirms the nervousness in the world that South Africa may cross the threshold and become a nuclear weapons state.

If South Africa does not sign the NPT, the world will be no closer to knowing the position.

/12232

#### Country's Nuclear Capability Discussed

51000020 Johannesburg *FINANCIAL MAIL* in English  
19 Aug 88 pp 51, 52

[Text] SA has come closer than ever before to admitting that it has a nuclear arsenal. The indications came from Foreign Minister Pik Botha—on his way to discuss proposals on non-proliferation with the leading "depository" states which are party to the Nuclear Non-Proliferation Treaty (NPT): the U.S., UK and Soviet Union.

Botha told the media that SA had the capability to make nuclear weapons if it so wished. The purpose of Botha's visit is to discuss issues relating to the NPT with the three depository states. Should SA accede to the NPT, it would become obliged to open to the inspectorate of the International Atomic Energy Agency (IAEA) its uranium enrichment plant at Valindaba, as well as make the obvious commitment not to manufacture nuclear weapons.

The NPT, which was initially drawn up by the "Nuclear Club" of nations which already had nuclear weapon status to prevent the further spread of military nuclear capability, obliges new signatories to renounce attempts to develop nuclear weapons and to open all relevant facilities to inspection (so-called "Full Scope Safeguards"). The *quid pro quo* is access to nuclear technology strictly intended for peaceful purposes, as well as to the flow of information on such issues, notably safety matters.

Last September, State President P.W. Botha reacted to political efforts to expel SA from the IAEA (which is a much wider grouping than the body of signatories to the NPT), by stating that SA would consider signing the treaty.

Certain press reports have recently alleged that Botha has indicated the price for SA's accession to the NPT would be the issue of undertakings by its depository states guaranteeing protection against further efforts to expel SA from the IAEA for the usual political reasons. However, well-informed sources say that these reports are inaccurate and that Pik Botha's visit to Vienna is only the start of a long and complex negotiation process.

Recent press reports indicate that SA would insist on the right—untrammelled by sanctions—to buy and sell uranium internationally (including, undoubtedly, enriched uranium for power generation), plus full participation in international exchanges of nuclear technology, before it would be prepared to sign.

At present, all the nuclear facilities associated with the Koeberg nuclear power plant at the Cape are open to international inspection. Moreover, the terms of the contract for construction of Koeberg bar SA from undertaking any re-processing of fuel elements locally. And any plutonium extracted from spent fuel may not be returned to SA.

In any event, it would be a formidable scientific undertaking (in terms of radiation and chemical toxicity hazards as well as complexity of chemical separations), to process spent fuel elements from a nuclear power plant to extract the plutonium content for bomb manufacture.

Moreover, the mix of plutonium isotopes extracted from spent fuel elements is not at all satisfactory for making a plutonium bomb—which requires Pu239 rather than the Pu240 isotope, which is mainly produced in the mode in which a power plant reactor functions.

On the other hand, SA has thus far refused to let international inspectors anywhere near the Valindaba uranium enrichment plant, which officially is enriching natural uranium for the future use of Koeberg.

It has to be explained that natural uranium contains only 0.7 percent of the active isotope U235, the vast preponderance being the isotope U238, which although radioactive, is not spontaneously fissile. The type of power reactor used at Koeberg requires enrichment to a U239 level of around 3 percent (some four-fold).

But SA years ago announced that it had produced, at Valindaba, enough uranium enriched to 45 percent of U235 (and used that uranium to fabricate enough fuel elements to charge the nearby Safari research reactor at Pelindaba). As the FM commented at the time, the military implications were obvious. To go from 0.7 percent U235 to 45 percent represented a degree of enrichment of over 60-fold.

A uranium bomb requires "weapons grade uranium"—that is material containing around 90 percent of U235, or only twice as much as the content of the quantity

reported on. Clearly, the announcement was intended as a signal that SA could, quite easily, achieve the further two-fold degrees of enrichment required to make weapons-grade uranium.

Over the years, various reports or rumours have surfaced pointing in the direction of efforts to develop a nuclear weapons capability. It was reported that SA had built a suspicious looking tower in the Kalahari desert, to which the Soviets drew American attention, claiming that this was evidence that SA was planning to test a bomb.

Then there was the vexed issue of the "double flash" of light observed in the southern Atlantic in 1979, which experts said was the characteristic "signature" of a nuclear explosion. But no radiation from the supposed explosion was ever detected. And there had been repeated allegations (strongly denied by SA) that this country and Israel work hand-in-glove on nuclear weapons research.

The British SUNDAY TIMES recently quoted American experts as attributing to SA a nuclear arsenal of between 9 and 23 bombs, deliverable through artillery, aircraft, or even ballistic missiles.

It is an easy guess that SA is making strenuous efforts to improve its international image, through attempting to appear very reasonable both on the terms of an Angolan-Namibian settlement and on the vexed question of nuclear weapons.

Whether the depository powers to the NPT can effectively deliver the guarantees that SA requires to justify its adherence remains to be seen. At the very least, we may suppose that SA has had to given certain commitments to the outgoing Reagan administration as the

price for assuring a presidential veto of the Wolpe-Dellums Sanctions Bill, if it overcomes the hurdles of a hearing and a vote in the U.S. Senate.

There might also be the hope that SA could fortify itself against one element of sanctions by signing the NPT while it is still in office, which would confer all sorts of tactical advantages in the supply of enriched uranium if Michael Dukakis wins.

#### Linkages exposed

If SA, against the odds, were in the NPT by next January, the linkages between American abstention from uranium sanctions and SA's abstention from bomb manufacture would be fairly clearly exposed, even to the most obtuse U.S. legislators.

On the other hand, sceptics (or perhaps cynics) might argue that it is relatively cheap to make offers in principle of this sort, knowing that even the Reagan administration could not effectively assure SA's supplies of enriched uranium at this stage in the U.S. Political process—so that SA's offer would in principle, boil down to a gesture.

The FM remains cautious: it is difficult to believe that SA would readily be prepared to sign away its ability to create (or perhaps augment) a stockpile of nuclear weapons for the sort of gains achievable through membership of the NPT (with an assurance of continued membership of the IAEA thrown in for good measure).

After all, the possession of a modest, but credible nuclear deterrent must have enormous political/military value, through vastly reducing the probability (itself admittedly not large) of an invasion of SA by either superpower.

Plausibly, we will not discover how much SA is really prepared to give away, at least until after the American presidential election in November.

/12232



### **Bigger Emergency Zones Urged Around Ontario Nuclear Stations**

51200041 Toronto *THE GLOBE AND MAIL* in English 8 Aug 88 p A8

[Article by Christie McLaren]

[Text] Ontario should broaden its nuclear-emergency plans to protect everyone living within 13 kilometers of Ontario Hydro's nuclear power stations, a Government-commissioned task force says.

The provincial Government's formal Nuclear Emergency Plan, published in 1986, establishes emergency procedures, including evacuation, for a 10-kilometer radius around Ontario Hydro's Pickering, Bruce and Darlington nuclear generating stations.

But the theoretical risk of radiation exposure from these plants makes it necessary to protect people who live farther away, says the report, which was released last week without official announcement.

During the 1986 disaster at the Chernobyl nuclear plant near Kiev in Ukraine, officials moved people who lived within 30 kilometers of the burning reactor.

Ontario's chief of nuclear planning, F. B. Ali, would not comment on Friday on whether the size of the emergency-planning area will be expanded to a 13-kilometer radius.

"It will be a political decision of Cabinet," he said.

The eight-member working group—which included experts from Ontario Hydro, Atomic Energy of Canada Ltd. and the federal Atomic Energy Control Board—was set up by the Government last year to determine whether the province's emergency plans are based on technically sound information.

Its report is being circulated to government and non-government agencies for comment by the end of October and Solicitor-General Joan Smith will make recommendations to Cabinet after that.

The panel recommended that Ontario's emergency-planning zone for the controversial Fermi 2 nuclear reactor at Monroe, Mich., should remain at 21.5 kilometers, reflecting a greater potential for risk at that station.

It said the emergency-planning zone for AECL's Chalk River Nuclear Laboratories should remain at 10 kilometers, reflecting a smaller risk.

The working group called for two tiers of emergency planning: one for accidents caused by engineering failures, and a second for "worst-case" accidents caused by "gross human error or hostile action," which it said would theoretically occur less frequently.

But the experts tossed several controversial issues back in the Government's lap:

—The group did not recommend whether iodine pills should be distributed to people living within emergency-planning zones in advance, or after an accident occurs. (Potassium iodide supplements are necessary in the event that a nuclear accident releases enough radiation to permanently harm a person's thyroid gland.)

—It also said the Government should decide whether there is a need for early-warning systems for the public and adequate medical facilities to deal with possible acute radiation exposure.

—And it said the Government should decide whether it is advisable to restrict new housing construction near nuclear plants.

In addition to Hydro, AECL and AECB, the working group's experts were drawn from the University of Toronto and the Ontario ministries of Labor and the Solicitor-General.

While most of the recommendations were unanimous, Ontario Hydro's representative disagreed with the recommendations on the size of the emergency-planning zones.

In a dissenting opinion dated June 30, Gerry Armitage, manager of health physics services at the Pickering station, said the 10-kilometer zone around Hydro's stations is technically adequate.

Mr Armitage also said the working group intended to leave the details of emergency planning to the Government.

In April, another study said Ontario is not ready for a severe nuclear accident.

In that report, commissioned by the Government, University of Toronto geographer Dr Kenneth Hare said a Chernobyl-style nuclear accident is impossible in Ontario, but other types of serious nuclear accidents affecting the public could occur.

Dr Hare criticized the Government harshly for failing to put its 1986 nuclear-emergency plan into place, saying it is "urgently necessary that a formal nuclear emergency-planning branch be created within the Ministry of the Solicitor-General, and all the preparedness provisions of the plan be affected."

Mr Ali said the Government is now tripling the size of its nuclear emergency-planning office.

By this fall, the number of employees devoted strictly to nuclear emergencies will increase to six or seven from two, and the annual budget will rise to \$450,000 or \$500,000, from \$150,000, he said.

07310



### **Commons Committee Urges Ottawa To Boost Nuclear Support**

51200042 Toronto THE GLOBE AND MAIL in English 26 Aug 88 pp B1, B2

[Article by John Kohut]

[Text] A House of Commons committee, saying the impact of nuclear energy has been misunderstood by the public, has called on the federal Government to step up its support of nuclear power development.

In a report based on nine months of research into Canada's nuclear program, the Standing Committee on Energy Mines and Resources said nuclear power will be vital in the future because of anticipated inadequacy of conventional petroleum resources.

It also said a strong case in favor of nuclear power can be made on the basis of environmental degradation resulting from burning coal in progressively greater quantities for electricity generation.

"Unfortunately...neither the federal Government nor the nuclear industry has articulated that case very well over the years and the public attitude has become ambivalent," says the 186-page report, released yesterday.

Among the key recommendations of the committee, headed by member of Parliament Barbara Sparrow, is that Ottawa give more money to Atomic Energy of Canada Ltd., a Crown corporation, and guarantee such support for a minimum of five years.

Cutbacks announced by Finance Minister Michael Wilson four years ago have led to federal financing for AECL falling to \$175-million in the last fiscal year from \$326-million in 1984.

The report says AECL will have to fight hard against U.S. and European competitors for the few nuclear reactor sales expected in coming years, and should therefore diversify as soon as possible because it stands little chance of surviving based on the reactor business alone.

While in favor of Ottawa's proposals to privatize two AECL divisions in the near future—Radiochemical Co. and the Medical Products Division—the committee expressed concern that AECL's applied research would

be crippled by those sales. So it recommends that AECL retain a minority interest in the two units and set limits on foreign ownership in them.

The Sparrow report also recommends that the basic insurance coverage on Canada's nuclear facilities be raised substantially.

The current maximum liability on Canadian nuclear facilities, now \$75-million for a multi-nuclear generating station, is not sufficient, given the liability claims of more than \$1-billion after the Three mile Island accident and more than \$2-billion in the case of the Chernobyl disaster, the report says.

It falls short, however, of making specific recommendations on an appropriate minimum level of coverage.

The committee also recommended that:

- AECL come up with a clear program for establishing a nuclear waste disposal facility by the end of June 1989;

- Ottawa increase federal financing for the Atomic Energy Control Board—which appears to be "substantially deficient in money and manpower"—so that it can more effectively regulate Canadian nuclear development. Federal financing of the control board totals about \$24-million annually.

Norman Rubin, of the Toronto-based Energy Probe environmental research group, rejected the committee's report, which he said calls on taxpayers to foot a larger part of the bill for an industry that has so far proved unable to support itself and that puts the environment at risk.

"The committee has merely promoted nuclear waste as if it was the only answer to coal waste," he said.

But Ian Wilson, vice-president of the Canadian Nuclear Association, called the report a strong endorsement of the industry. He acknowledged that for the industry to gain further support, "the public needs reassurance on the issue of long-term waste disposal."

Officials of the Ministry of Energy were unable to comment immediately on the report, which was still being sent to interested parties yesterday.

07310

**Head of Nuclear Society on Nuclear Development**  
HK1409060483 Beijing RENMIN RIBAO OVERSEAS  
EDITION in Chinese 9 Sep 88 p 2

["Special Interview" by Wang Xiaolin (3769 1420 2651):  
"Nuclear Power, the Choice for the Present and  
Future—An Interview With Jiang Shengjie, President of  
the China Nuclear Society and Director of the China  
State Bureau of Nuclear Safety"]

[Text] Prof Jiang Shengjie is a well-known Chinese  
nuclear engineer and the recipient of the French Knight  
Medal (Honors). Prof Jiang Shengjie was born in Lin-  
dian County, Heilongjiang Province in 1915. In 1936,  
Jiang Shengjie graduated from the Mechanics and Elec-  
tricity Department of Hebei Engineering Institute. In  
1948, Jiang Shengjie went to the United States to study  
in the Graduate School of Columbia University and  
received a M.Sc. Degree upon graduation.

In 1962, under the instruction of Premier Zhou Enlai,  
Jiang Shengjie became general engineer of China's first  
nuclear fuel manufacturing plant. Jiang Shengjie person-  
ally led and organized the construction of China's first  
nuclear reactor designed to produce the fuel needed by  
nuclear weapons and thus became one of the first gener-  
ation of China's nuclear industrial experts who helped  
lay a solid foundation for the future development of the  
nuclear industry. Jiang Shengjie and his colleagues pro-  
posed turning the Soviet-provided nuclear fuel made  
through precipitation into nuclear fuel made through  
extraction before treating it, thus inventing new nuclear  
technology. Mr Jiang Shengjie has also written numerous  
scientific works, among which "The Technology of Suc-  
cessfully Manufacturing Multilayer High Pressure Con-  
tainers," "The Future World Is the Nuclear Energy  
World," "The Technology of Synthetic Ammonia Pro-  
duction" (four volumes), "The Technology of After-  
Treatment of Nuclear Fuel," and so on are the most  
influential scientific works.

**The Realistic and Feasible Way To Solve the Problem  
of Energy Shortage Is To Greatly Develop Nuclear  
Energy and Nuclear Industry**

Question: Energy is an important factor in the develop-  
ment of productive forces and social progress. Nowa-  
days, all the countries in the world regard the develop-  
ment of energy as an important strategic question. As far  
as our country is concerned, along with the development  
of the national economy, the problem of energy shortage  
has become increasingly serious and the key factor  
restricting our country's economic growth. How do you  
view this situation?

Answer: As a matter of fact, not only China is suffering  
from an energy crisis but nearly all the countries in the  
world are. The rapid development of industry and civil-  
ization has inevitably increased greatly the demand for  
energy. Therefore, there has been a contradiction  
between the limited energy resource and the growing

demand for energy. This contradiction is the root cause  
of the present worldwide economic crisis. As far as the  
situation of our country is concerned, the problem of  
energy shortage is more serious. In the past, we always  
boasted that "China is a country which has a vast  
territory and abundant resources" and were content with  
the absolute amount of resources we had. Truthfully  
speaking, as far as the per capita resources of our country  
are concerned, our country neither has "a vast territory"  
nor has "abundant resources." As far as energy is con-  
cerned, besides coal, our country is not very rich in  
resources. Our country's resources are not evenly distrib-  
uted. The structure of our country's resources is irration-  
al. Therefore, we should clearly understand this situa-  
tion and the present energy crisis of our country and  
should feel a sense of urgency. However, we should not  
be pessimistic and should not lose our confidence. We  
should believe that so long as we make continued efforts  
to tackle the problem of energy shortage, the problem of  
energy shortage will certainly be resolved in the future.

Question: What do you think is the best way to free  
China from her present energy crisis quickly and enable  
China to eliminate this negative factor restricting her  
economic development?

Answer: In a long-term point of view, in carrying out the  
development of energy resources, China should smash  
her coal-centered unitary energy structure as quickly as  
possible and make increased efforts to develop all types  
of energy resources. However, this is the long-term task.  
It is impossible for China to accomplish this long-term  
task within a short period of time. At present, the only  
realistic and feasible way for China to solve her problem  
of energy shortage is to greatly develop nuclear energy  
and nuclear industry.

**Since China Has So Much Coal, Why Should China  
Still Need To Develop Nuclear Energy?**

Question: China is rich in coal resource and now ranks  
third in the world with regard to her coal reserve. China's  
proved coal reserve has reached 840 billion tons which  
can be used for more than 800 years. Since China has  
such a huge coal reserve, the coal production and con-  
sumption always accounts for over 70 percent of China's  
energy production and consumption, and the extensive  
use of coal has become a traditional practice in China,  
why should China still need to develop nuclear energy?

Answer: Although China has a large amount of proved  
coal reserve, the per capita coal reserve of China is not  
high. Of China's proved coal reserve, the recoverable  
economic coal reserve accounts for only a small propor-  
tion. At present, China's per capita energy consumption  
is only one third of the world per capita energy consump-  
tion. Along with economic development and population  
growth, China's total energy consumption will soon rise  
rapidly. In 1987, China produced 28.4 times as much  
raw coal as it produced in 1949. By the year 2000,  
China's annual raw coal output will have increased by

50 percent over that of 1987, reaching 1.4 billion tons. Even so, China's raw coal output will still fall short of her demand. A few years ago, thanks to the rapid development of the town and township coal mines, China's coal supply increased for a period. However, we should understand that China's town and township coal mines have only been built for a short period and therefore still have a lot of short-term behavior and lack reserve strength. This limitation of China's town and township coal mines began to be exposed in 1987. In 1987, China's coal supply gradually decreased. As a result, some newly built power plants were under the threat of the lack of energy. In the future, the contradiction between coal supply and coal demand will certainly be further intensified.

**Question:** This is only one of the disadvantages in using coal. Are there any other disadvantages?

**Answer:** Yes, there are many disadvantages in using coal. First, there is a transportation problem. It is known to all that railway transportation in China has always been in great demand. Why? I'm afraid that this problem also has something to do with coal transportation. At present, China's coal transportation accounts for 40 percent of her total transportation volume. Now, China is building or is planning to build more railroads mainly for the purpose of transporting coal. In the future, along with the exhaustion of coal fields in the eastern part of China and the growing consumption of coal, China's coal transportation problem will certainly be aggravated. Second, there is a problem of environmental pollution in using coal. China's air pollution mainly belongs to smoke pollution. Some 80 percent of air pollution is caused by the smoke from burning coal. In 1952, the incident of "London Smog," which killed 4,000 people, was caused by coal-smoke pollution. At present, during the high temperature period in China, coal-smoke pollution in many cities in North China has reached the preliminary level of the incident of "London Smog" and is becoming very serious. The "greenhouse effect" in China's climate, which has been caused by the accumulation and increase of carbon dioxide released from burning coal, has become a common concern of the people because the "greenhouse effect" will certainly raise the average temperature in China. As a result, regions like North China and Northwest China, which are traditionally dry regions, will become drier. Coal is also a very important raw material for the chemical industry. When it is used to produce chemical products, one can produce better economic results than used as fuel. Therefore, there are more disadvantages than advantages if coal is used as a type of energy.

#### **The Development of Nuclear Energy Conforms With China's National Situation**

**Question:** Building nuclear power stations is technologically difficult and requires large amounts of investment funds. China's scientific and technological standard is still low and lacks funds. Is it right to regard the

development of nuclear energy as China's short-term task and does the development of nuclear energy conform with China's national situation?

**Answer:** It is true that the safety requirements for building nuclear power stations are higher. Even the technologically advanced countries in the world have to invest more in the building of nuclear power stations than in the building of coal power stations. Since China is still at the initial stage with regard to the building of nuclear power stations, she has to invest more in the building of nuclear power stations than the technologically advanced foreign countries have to. The present situation of China shows that at present, she should resolutely carry out the development of nuclear energy, but at the same time, should not build too many nuclear power stations. China's purpose for developing nuclear energy in this century is to master advanced nuclear technology. What China should do at present is to import advanced foreign nuclear technology, build a number of nuclear power stations in the areas where energy is in great demand, and gradually build nuclear power stations by using the equipment made by herself so as to gradually reduce the cost of building nuclear power stations and lay a solid foundation for the greater development of her nuclear energy in the next century. So long as China can produce most of the equipment needed by the nuclear power stations and can carry out batch process of such equipment on a certain economic scale, China will certainly be able to reduce the cost of her nuclear power production to approximately the level of her coal power production.

Foreign countries' experiences show that at the very beginning, the development of nuclear energy, which needs large amounts of investment and usually takes a longer period of time, has to be financially supported by the government. Therefore, China should first of all make long-term practical plans for the development of her nuclear energy to guarantee sufficient investment in its development. I believe that after several years of endeavor, China will be able to enable the output of her nuclear industry to exceed the input and will be able to independently carry out the development of nuclear energy.

#### **Safety Is Guaranteed in the Development of Nuclear Energy**

**Question:** Nuclear energy is a type of clean energy which is very powerful, convenient to transport, and capable of producing good economic results. Therefore, the prospects of the development of nuclear energy are very bright. However, people are still understandably worried about nuclear radiation which is harmful to the human body. Over the past few decades, mankind has become increasingly worried about the deterioration of the ecological environment in which it lives. Nowadays, nuclear disasters have become the common concern of the people of all the countries in the world. The harm done to mankind by nuclear weapons in human history still



remains fresh in people's minds. The accident that happened at the Soviet Chernobyl Nuclear Power Station has added to the psychological pressure of the people. Will you please talk about what type of safety guarantee China has in building her nuclear power stations?

Answer: The safety standard China has now adopted is one formulated on the basis of summing up the experiences of the foreign countries in this field over the past decades and in the light of the national conditions of China. So the safety standard China has now adopted has a very high safety coefficient. When designing the water-pressurized reactor, China has adopted the most mature international technology and has designed three protective shells, namely, safety shell, pressure shell, and external shell, to guarantee the maximum safety of the nuclear reactor. The two major nuclear accidents that have happened in the nuclear history of the world (the Three Mile Island nuclear accident and the Chernobyl nuclear accident) were the result of the carelessness of the operators at the two nuclear plants and had nothing to do with the technology of the water-pressurized reactors. High standards and strict requirements are the principles China has adhered to in building nuclear power stations. Here, I'd like to stress that fear of nuclear energy is unnecessary. The Soviet Chernobyl nuclear accident was a major nuclear accident which shocked the whole world. However, only 32 people were killed in the accident and only a small number of people were affected by the nuclear radiation. However, so far, tens of thousands of people have been killed by accidents in various coal power stations in the world, but the deaths of these people have not attracted so much attention as the deaths of people killed in the nuclear accidents. This shows that people have an abnormal psychology toward nuclear energy.

Question: The construction of the Daya Bay Nuclear Power Station in Guangdong Province has attracted the concern of the Hong Kong people. The Hong Kong people are very worried about the safety of the Daya Bay Nuclear Power Station. May I ask whether or not the Daya Bay Nuclear Power Station will affect the safety of Hong Kong?

Answer: As I have said before, China has developed her nuclear energy on the basis of summing up the foreign countries' experiences in building nuclear reactors and has now established a complete set of safety systems to guarantee the safety of her nuclear reactors. Therefore, the worries of the Hong Kong people are unnecessary. The site of the Daya Bay Nuclear Power Station in Guangdong Province is 50 kilometers away from Hong Kong. Such a distance conforms with the international requirement on the sites of the nuclear power stations. The sites of some of the nuclear power stations built in the United States and Taiwan are even less than 50 kilometers away from the nearby residential areas. However, these nuclear power stations have not caused any harm to the local residents. The cleansing range of the

Soviet Chernobyl nuclear accident was within 30 kilometers of the Chernobyl nuclear power station. Therefore, 50-kilometer distance is not a short one. The worries of the Hong Kong people are unnecessary. I believe that the Daya Bay Nuclear Power Station will not cause any harm to the Hong Kong people once it goes into operation.

Now, China has just begun to develop her nuclear energy and still has to overcome a lot of difficulties in this regard. However, I am confident that after years of endeavor, China will certainly be able to greatly develop her nuclear energy. The development of nuclear energy will not only benefit our generation but also benefit the future generations of China.

**Nuclear Mistakes Hinder China's Progress**  
51004017c Hong Kong HONGKONG STANDARD in  
English 18 Aug 88 p 2

[Article by S Y Wai]

[Text] Last year's omission of reinforcement bars from the Daya Bay project was not the first case of defects in China's short history of civil nuclear power development.

Two incidents of structural deficiency were recorded at China's first nuclear station, being built in Qinshan, 120 kilometres south of Shanghai, in Zhejiang Province.

This was disclosed by Mr Jiang Shengjie, head of the Chinese National Nuclear Safety Administration (NNSA) and consultant to the Chinese Nuclear Industry General Company.

Speaking to the China News Service in Beijing, he said these deficiencies, including the Daya Bay omission, had been rectified according to NNSA regulations.

About 300 bars were omitted from the foundation raft of the Reactor 1 building of the Daya Bay plant in September.

The two incidents at Qinshan involved defects in welding of the safety shell on the reactor building and the foundation of the steam turbine building, he said.

For the safety shell, advanced technology was applied to rectify the quality of work which was later proved to be up to standard.

The original steam turbine building was pulled down after an inspection found holes in the concrete foundation. Everything was rebuilt, he said.

Both structures have passed quality inspections after rectification work.



Mr Jiang said "quality first" was the working principle of NNSA, which applied to the selection of nuclear station sites, station design, construction and operation.

Since its establishment in 1986, safety regulations on these four areas had been enacted, he said.

Every possible step was taken to ensure aspects of the nuclear industry would come under NNSA's umbrella, he said.

Nine years after it began to take up nuclear technology, China became the world's fifth nuclear power in 1964 behind the United States, the Soviet Union, Britain and France. It began serving the needs of national economic development in the early 1980s.

The Qinshan station is expected to go into operation in 1990. The first stage of the project includes a 300-megawatt nuclear reactor and two 600-megawatt reactors will be built in the second stage.

The \$28.8 billion Daya Bay plant, the biggest civil nuclear power project in China so far, in Guangdong Province, is well advanced. Its two 900-megawatt pressurised water reactors are expected to be operational by 1993.

/9604

#### **Pictorial Report Depicts Progress in Daya Bay Project**

51004017a Hong Kong HONGKONG STANDARD in English 30 Jul 88 p 2

[Text] The first pictorial report on progress at the \$28.7 billion Daya Bay nuclear power plant was yesterday distributed in Hongkong.

The six-page colour special was published in Chinese and English versions by the Guangdong Nuclear Power Joint Venture Company (GNPJVC), which oversees the project.

In a press statement, the Hongkong Nuclear Investment Company (HKNIC) said GNPJVC wanted the report distributed among the Hongkong public to keep them informed of latest developments.

"Further reports will be published, as and when appropriate, until the project is completed," said the HKNIC which holds 25 percent of the equity in the project.

The first of the plant's two 900-megawatt pressurised water reactors is scheduled to be loaded with nuclear fuel by March 1992.

And the first reactor unit is to be commissioned in late 1992 and the second in mid-1993.

The eight-part report also contains tables and illustrations, plus an introduction, history of how the project got underway, the composition of the GNPJVC and how the future electricity generated will be distributed.

It also dedicates a section to France's technical role in the project, site location, structure of plant and how it will function.

Illustrations include a map showing the electricity transmission network connecting the plant with Guangzhou, Shenzhen and Hongkong as well as a picture of the plant's safety features.

The report also touches on last September's controversy over the omission of 316 out of 576 starter bars in the first layer of the foundation raft of the first reactor unit.

It says the cause of the error was found and remedial action was taken to fully meet design criteria.

The report says that the GNPJVC has completed its own investigation into the cause of this problem and has taken steps to strengthen quality management to avoid similar occurrences in future.

Due to this omission, work on the raft has been delayed. But it is expected to be back on schedule by the end of this year.

/9604

#### **Developer To Draft Panel on Daya Bay**

51004017b Hong Kong SOUTH CHINA MORNING POST in English 2 Aug 88 p 1

[Article by Andy Ho]

[Text] A proposed independent Sino-Hongkong body to monitor the Daya Bay nuclear power plant is to be a panel whose membership and jurisdiction will be decided by the developer of the \$28.8 billion project.

The Chinese authorities have requested the Guangdong Nuclear Power Joint Venture Company (GNPJVC) to work out the details on how the safety consultative body with Hongkong members should be established.

In a terse statement yesterday, GNPJVC said an announcement would be made after it had finalised the membership and terms of reference for the panel.

China's decision to let the nuclear utility establish the long-awaited advisory body has drawn severe criticism from local environmental activists.

The Joint Conference for the Shelving of the Daya Bay Nuclear Plant, a coalition of 117 pressure groups, called the arrangement ridiculous.

The Reverend Fung Chi-wood, who heads the alliance, said: "What can the Hongkong residents expect of a so-called independent Daya Bay watchdog body which is engineered by the very company which is responsible for constructing the nuclear station."

The coalition demanded the proposed panel be directly accountable to the Chinese National Nuclear Safety Administration, which in turn is answerable to the State Council.

About a dozen Hongkong residents and Government officials have been approached by the company.

The committee's first working session is scheduled for October.

Among the members shortlisted are three legislators—Miss Maria Tam, Mr Wong Po-yan and Mr Stephen Cheung Kam-chuen—who had argued in support of the nuclear investment in a Legislative Council debate on the issue.

The idea for an independent Sino-Hongkong Daya Bay advisory body was first put forward in the report of a Legislative Council nuclear energy fact-finding mission, led by Miss Tam.

Others said to be included on the panel are two Basic Law Consultative Committee members, Dr Raymond Wu Wai-yung and Dr Raymond Ho Chung-tai.

It is understood that an environmentalist, Mr Wan Shik-lun, has also been approached.

Mr Wan, an environmental protection consultant, is a leader of the pressure group Green Power.

But other activists were quick to point out that despite his anti-nuclear views, Mr Wan was not involved in the mass campaign against the Daya Bay project.

He was out of town and not available for comment yesterday.

The joint venture company has also approached relevant Government officials who have been involved with monitoring the Daya Bay developments here.

All members, to be invited to serve on the panel in a personal capacity, will be given an initial 2-year term of office.

Other members will include Chinese officials and senior executives from the joint venture company and its 25 percent partner—the Hongkong Nuclear Investment Company (HNIC).

The station, whose twin reactors will produce 900 megawatts each, is being built on the Daya Bay site, 52 km northeast of Hongkong. It is due to begin generating electricity in 1992.

Public concern about the project was raised after it was discovered that 316 iron bars had been left out of the reinforcement of the first layer of the reactor base.

The failure to adhere to specifications had occurred when a technician had misinterpreted a drawing by the project designer, Electricite de France.

The managing director of the HNIC, Sir Jack Cater, announced that remedial work had been carried out to the company's satisfaction, although there was some concern over an obvious breakdown in quality control.

Chinese officials subsequently overhauled control procedures.

79604

## HONG KONG

### **Xinhua Role Planned for Daya Safety Panel**

51004018a Hong Kong *HONGKONG STANDARD* in English 3 Aug 88 p 2

[Article by Frank Choi]

[Text] The Hongkong Branch of the Xinhua News Agency is expected to play a significant role in the safety consultative panel of the \$28.8 billion Daya Bay nuclear power plant.

It is understood that senior Xinhua officials will provide back-up services to the panel, although their exact role has yet to be defined.

It has also been suggested that a Xinhua official might be given a seat on the consultative body. Other possibilities include the agency providing a secretariat service or acting as a liaison body for the panel.

Xinhua has been playing a major coordinating and liaising role in the past year for the setting up of the consultative body.

The proposed body will be formed by the Guangdong Nuclear Power Joint Venture Company (GNPJVC) next month under the instructions of the Chinese National Nuclear Safety Administration which is in turn answerable to the State Council.

An official from the administration is expected to be appointed to the panel.

Political analysts suggest the approval of China's central government in setting up the panel has been a significant concession to allow Hongkong participation on the consultative body to ensure the safety of the nuclear power plant.

Well-placed sources said the proposal to set up the panel had been debated among senior Chinese officials in the central government for about a year before a final decision was made, on the instructions of top Chinese leaders.

China's approval of Hongkong's participation has significant political bearings, analysts said. This showed that Chinese leaders had recognised the merits of the consultation system in Hongkong, they added.

Earlier, China had agreed to look into the possibility of forming an advisory panel as a watchdog for the plant's safety but did not give a commitment on possible participation by Hongkong.

Officials were also said to be sceptical about the suggestion to include central government officials. But members of the Legco ad hoc group on Daya Bay had been known to be pushing hard for involvement of the central government and had refused to back down from this position.

The panel will serve as a cross-border consultative body on the safety aspects of the Daya Bay plant to ensure two-way communication between Hongkong and China.

Analysts suggest that the panel will be an influential body to convey Hongkong people's views directly to the highest echelons of the Chinese leadership on subjects that relate to improving safety standards at the plant.

With the blessings of the central government, the panel is expected to be vested with power to initiate topics relevant to the safety of the power plant for discussion and consideration during their regular meetings. The panel is scheduled to have its first working session in October.

The setting up of the panel was a proposal included in the Legislative Council ad hoc group report on Daya Bay following their fact-finding tours to the United States, Europe and Japan.

The panel is likely to comprise Chinese officials involved in nuclear energy, Hongkong legislators, environmental protection experts, engineers and medical experts.

Possible panel members from Hongkong include Mr Wong Po-yan, retiring legislator and convenor of the Legco ad hoc group on Daya Bay, Executive and Legislative Councillor Miss Maria Tam, and Legco member Mr Stephen Cheong.

Other hopefuls include two members of the Basic Law Consultative Committee, Mr Raymond Ho and Mr Raymond Wu.

Hongkong Government officials will also be invited to sit as panel members. They include representatives from the Royal Observatory and the Electrical and Mechanical Services Department. An expert from the Hongkong Polytechnic is also expected to be invited.

/9604

### **Three Hong Kong Experts To Sit on Daya Bay Panel**

51004018b Hong Kong *SOUTH CHINA MORNING POST* in English 6 Aug 88 p 1

[Article by Andy Ho]

[Text] Three independent local scientists have been invited to sit on the Sino-Hongkong Daya Bay panel which will advise on safety aspects of the \$28.8 billion nuclear power project.

Dr Raymond Yeung Man-kit of Hongkong University, Professor Kenneth Young of the Chinese University and Mr Leung Tin-pui of the Hongkong Polytechnic have been approached by the local branch of the New China News Agency.

The academics will give the panel—to be named the Nuclear Safety Consultative Committee—a more independent image.

Environmental activists have been sceptical of the pro-Daya Bay background of several members who have been identified to join the panel and the fact that the developers, the Guangdong Nuclear Power Joint Venture Company (GNPJVC) were involved in the selection of members.

The panel will be responsible for ensuring that the developers keep abreast with international safety developments.

The panel members will, however, not have any jurisdiction over the financial affairs of the scheme. The GNPJVC has undertaken to give the panel an explanation should it turn down any of the members' recommendations.

The watchdog body holds its first working session on Friday at the Shenzhen headquarters of the GNPJVC, which will be represented by a top technical officer.

A senior official of the Chinese Ministry of Nuclear Industry will also be appointed to the panel to improve communications with the nuclear authorities in Beijing.

Mr Wong Po-yan, who heads the Legislative Council ad hoc group on Daya Bay, will co-chair the panel with a former president of the Hongkong Institution of Engineers, Dr Raymond Ho Chung-tai.

Other panel members include Legislative Councillor Stephen Cheong Kam-chuen, former Hongkong Medical Association chairman Dr Raymond Wu Wai-yung and environmental protection consultant Wan Shek-lun.

The group will be made up of 11 to 15 members, none of whom will come from the New China News Agency even though it has been involved in the selection process.

Hongkong Government officials have been approached to join the group in their individual capacities but the Government is reluctant to allow this.

The three academic appointees are well respected in the local science community.

Professor Young of the Chinese University is an expert in nuclear energy generation.

He was involved in a number of public seminars on Daya Bay before major contracts for the project were signed 2 years ago.

Professor Young has questioned why the China Light and Power Company had not made public its findings on risks and environmental problems associated with the atomic scheme.

Mr Leung Tin-pui, the head of the Hongkong Polytechnic's Mechanical and Marine Engineering Department, chairs the Hongkong Institution of Engineers' nuclear power committee.

Last month, his working group submitted to the Legislative Council a set of observations on a British consultancy report on nuclear accident emergency planning for Hongkong.

Dr Raymond Yeung is a Massachusetts Institute of Technology-trained nuclear engineer and worked for the American nuclear utility giant, Westinghouse.

He now teaches at Hongkong University's Mechanical Engineering Department.

Dr Yeung yesterday said he had yet to give a formal reply to the NCNA.

"I hope we ensure that Daya Bay's safety measures are up to international standards. We will also try to bring about possible safety improvements, if there is such a need," he said.

The Daya Bay plant, 52 kilometres northeast of Hongkong, is scheduled to begin generating electricity in 1992. Concern over safety standards was raised after it was discovered that 316 iron bars had been left out of the reinforcement of the first layer of the reactor base.

The new group will make the Legislative Council's existing Daya Bay ad hoc group redundant.

/9604

**Chairman Rises to Defence of Daya Bay Panel**  
51004018c Hong Kong SOUTH CHINA MORNING  
POST in English 9 Aug 88 p 2

[Article by Andy Ho]

[Text] Hongkong's most senior man at Daya Bay has defended the integrity of a cross-border advisory panel being set up by his company at Shenzhen to advise on the safety aspects of the nuclear power scheme.

Environmental activists are sceptical of the panel, whose membership and jurisdiction are defined by the utility company which will operate the future Daya Bay facilities.

But Mr William Stones, first deputy chairman of the Guangdong Nuclear Power Joint Venture Company, last night described the committee members as those who had the interests of Hongkong at heart.



The members, mostly from Hongkong, are selected by the joint venture company, which is responsible for the \$28.8 billion Daya Bay nuclear power plant now being built about 30 km northeast of the border.

Speaking after a New Territories Rotary Club meeting, Mr Stones said: "The members are all highly professional, very competent and sincere people who work very hard for Hongkong.

"I have no reason to suspect any of them will do anything other than to show their integrity by challenging what we do.

"Somebody has to select the members somehow," he said, adding that his company would welcome any challenge from the panel.

"We in Daya Bay ought to be capable of being challenged. We are quite happy to accept that."

Mr Stones also pledged to furnish the committee with adequate information on the project and said the panel would serve as a good communication link to inform the Hongkong public of developments at Daya Bay.

Members will also study reports from different overseas nuclear authorities to ensure that safety measures at Daya Bay are up to international standards.

Mr Stones is also the managing director of the China Light and Power Company, which holds a 25 percent stake in the Daya Bay joint venture with China through its fully-owned subsidiary—Hongkong Nuclear Investment Company.

Although not a member of the Sino-Hongkong advisory panel, Mr Stones will deliver a statement to the group's first working session at the joint venture group's headquarters in Shenzhen on Friday.

The list of members on the panel has yet to be finalised but the names identified so far include Legislative Councillors, Mr Wong Po-yan and Mr Stephen Cheong Kam-chuen.

The Chinese Ministry of Nuclear Industry and the joint venture group will also be represented on the panel.

/9604

**Consultative Committee Expects Dual Role**  
*51004018d Hong Kong HONGKONG STANDARD*  
*in English 11 Aug 88 p 2*

[Text] The independent Sino-Hongkong consultative committee on the Daya Bay nuclear plant will play a monitoring role in addition to its advisory capacity, its chairman said yesterday.

Legislative Councillor Mr Wong Po-yan said authorities responsible for the \$28.8 billion project are required to relay majority opinions of the committee to Beijing.

"If our majority advice or opinion is reasonable, I can't see any grounds for (the responsible authorities) to reject them," he said.

Twelve of the 14 seats on the committee are held by Hongkong representatives.

The committee is to be inaugurated in Shenzhen tomorrow.

Mr Wong said he was satisfied with the composition of the group, which includes environmentalists, engineers, doctors, academics and four legislators—including Mr Wong, who is also a Basic Law drafter and convenor of the Legco ad hoc group on Daya Bay.

The two remaining seats are held by representatives of the Guangdong Nuclear Power Joint Venture Company (GNPJVC), which oversees the project, and the Chinese General Corporation of Nuclear Industry.

The Chinese members will be responsible mainly for liaison work.

Mr Wong said he hoped the territory's strong representation would act as a bridge linking the Hongkong public to the project.

Hongkong members would relay the territory's worries and advice on safety issues at the plant, he said.

One function of the committee will be to discuss GNPJVC reports on the implementation and enforcement of safety measures. It will also keep people in Hongkong posted on these measures.

It will advise the GNPJVC on safety matters based on the regulations of the Chinese National Nuclear Safety Administration and international information on atomic energy.

Plant construction is well under way. The first of two 900-megawatt pressurised water reactors is to be loaded with nuclear fuel by March 1992.

Meanwhile, Dr Raymond Ho, the deputy head of the committee, said he will concentrate on quality management and the construction side of the project.

He said he hoped the GNPJVC would provide the committee with adequate information to ensure members have a full understanding of the project.

/9604

## ROMANIA

### Status of Nuclear Power Plants Discussed

51003005 Bucharest *ENERGETICA* in Romanian  
Vol 36, No 2, Feb 88 pp 62-72

[Article by Paul Emil Rascu, Bucharest Institute for Electric Power Studies and Design: "Major Electrical Equipment and Location of High Voltage Stations of Nuclear Power Plants. Worldwide Situation"]

[Excerpts]

### 2.2 Quality Control for Nuclear Facility Products and Services in Romania

In Romania, the quality of products and services for industrial facilities is controlled by the following laws:

Law No 7/1977 regarding the quality of products and services for conventional facilities includes:

- Conditions and documents defining the quality of industrial products;
- Quality assurance of industrial products for reliable operation and economic efficiency;
- Product quality control and material responsibility for violations of quality standards.

Law No 6/1982, regarding quality assurance for nuclear facilities and installations, includes regulations designed to assure, during design, fabrication, assembly, and operation, the level of quality required by nuclear safety criteria, as well as the operating safety and economic efficiency of nuclear installations and facilities (excerpt from chapter I, article 3).

Operating safety and economic efficiency are also covered by the provisions of Law No 7/1977, regarding conventional installations; the installations covered by the provisions of Law No 6/1982 are characterized solely by nuclear safety criteria that include all defects of products and services that can lead to failures which can endanger the environmental safety.

Specific quality requirements for products and services intended for nuclear facilities and installations, are established by national quality assurance standards (NRAC) formulated or approved by the State Committee for Nuclear Power (excerpt from chapter VIII, article 75). These standards, numbered AQ-01 through AQ-07, are divided into groups of activity referring to quality assurance for users, designers, equipment procurement, equipment fabrication, services (assembly and installation), placement in operation, and utilization of nuclear facilities.

The manner in which equipment fabrication must or must not correspond to the requirements of Law No 6/1982, is established in accordance with NRAC provisions, series AQ-04, chapter VII, which take into consideration six assessment criteria that are assigned point values based on the importance of the respective criteria; using table 7.1, their sum establishes a preliminary category for assuring the quality of the respective equipment, which can be rated into five categories, the first being the most demanding and the fifth corresponding to conventional fabrication consistent with the provisions of Law No 7/1977<sup>a</sup>.

In order to establish the most efficient collaboration for assuring the quality of nuclear installation products and services, Law No 6/1982 stipulates that design, fabrication, services, and utilization of these facilities can be carried out only on the basis of quality assurance authorizations issued by the State Committee for Nuclear Power (excerpt from chapter II, article 3). Among other things, the only action this provision considers justified is to assure nuclear facility quality requirements for the entire group of activities specified by NRAC series AQ-01 to AQ-07, with nuclear quality assurance for only some of the above activities being unjustified and inefficient.

Lastly, aware that assurance of all the requirements listed in NRAC series AQ-01 to AQ-07 leads to higher investment costs (about 25 percent more), it was decided that in order to limit arbitrariness, abuses, and waste of investment funds, the nuclear facilities and installations subject to the provisions of Law No 6/1982 will be established by decree of the Council of State (excerpt from chapter III, article 18).

In this light, products and services for high-voltage overhead power line connections were also analyzed for the Cernavoda CNE (nuclear power plant) National Electric-Power System (SEN) substation, keeping in mind the following:

- Calculations performed according to NRAC series AQ-04, chapter VII, for preliminary determination of a quality assurance category, have established that these projects fall in the quality category of conventional installations;
- Overhead high-voltage power line connections and the 400 kV substation are not facilities that can affect the nuclear safety of the area, since even the worst possible damage that they could undergo (total destruction) will not affect the nuclear safety functions of the reactor (consistent with AECL Guide No 79-03650-DC-001, 1980 edition: Safety Related Systems and Structures Classifications);
- Literature searches and discussions with various specialists have indicated that none of the nuclear power plants built in other countries require nuclear facility quality standards for high voltage power lines and power system substations<sup>9</sup>.

Based on the above, the projects for these power lines and for the 400 kV power system substation at the Cernavoda CNE, were classified by State Decree No 403/1985 as industrial projects of a conventional nature, subject to the quality assurance requirements of Law No 7/1977. At the same time, the decree emphasizes that according to NRAC provisions, products and services supplied for nuclear facilities and installations based on Law No 6/1982, refer to the same equipment and services as for conventional installations, with the additional requirement that quality assurance must be certified with written and approved documents.

### 3. Substation Location

#### 3.1. Location of Power Generation Equipment

As a rule, the building that houses the turbogenerator is located close to the reactor building (a building that houses devices and pumps for the reactor's own service being sometimes interposed between them), with heat exchangers being located so that steam and cooling water conduits will be as short and as straight as possible.

A generator building is not always erected; rather, as in the case of conventional power plants and depending on climate conditions, the turbine and generator are placed in the open air, under simple roofs to shelter the locations where operators carry out monitoring functions.

Depending on circumstances, when several turbogenerators are located at the same site, they are placed with respect to reactor buildings with their longitudinal axes parallel to the buildings (Bugey CNE for instance, figure 2), or perpendicular to it (Biblis CNE, figure 3, or Paluel CNE, figure 4), as a function of the terrain and general local conditions.

In conjunction with this placement, generator transformers and service facilities are located in the immediate vicinity of the generator, so that electric cables, which are generally heavily armored for safety consideration, will be as short as possible. This placement is in fact the rule encountered at all high power generators in conventional power plants.

#### 3.2. Location of Service Facilities Substation

Service facilities in nuclear power plants are supplied primarily from the generator's terminals, while their standby supply is obtained from a substation connected to the zone's high voltage network. This standby station is also most often used to supply facilities when a nuclear power plant is started after an extended idle period.

The location of this substation reflects whether it serves other consumers in the zone, or only the facilities of the nuclear power plant.

Considering the large number of consumers that must be supplied from the generator's local service, and based on detailed technical and economic studies that analyzed many possible variables, it was proposed and accepted that the facilities substation be located within the site at the Cernavoda CNE as well. The goal was to reduce supply line losses to a minimum; this station has a nominal voltage of 110 kV, is equipped with double

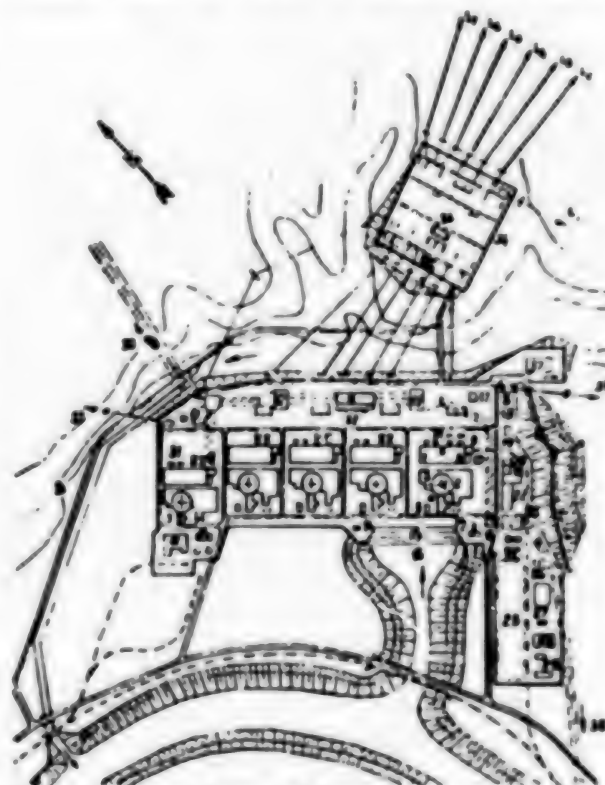


Figure 5. General Layout of Cernavoda Nuclear Power Plant in Romania

Key:—1. R1-R5 reactor building—2. SP nuclear building—3. Ventilation chimney—4. Building with electric alarm system for disasters and bloc control chamber—5. High pressure level building for cooling of active zone outages—6. Machine room—7. Gas removal element—8. Electric element—9. Diesel electric plant—10. Ventilation element—11. 110 kV electric power station—12. Hot water siphon basin—13. Cold water pump station and filtering house—14. Cold water control—15. Pavilion for coordination—16. Water intake—17. Storage of technical gas—18. Drinking water reservoir—19. H<sub>2</sub> station—20. Thermal power plant—21. SP common electric element—22. Water treatment station—23. Equipment storage—24. Fire unit—25. Free air storage—26. Acetylene and oxygen storage—27. Crude oil unit—28. Lubricant storage—29. Helium storage—30. Hot water return—31. Bloc transformer and SP transformer—32. SP 400/110 kV transformer and common SP transformer—33. 110 kV zonal LEA—34. 400 kV station—35. Control bloc—36. SP bloc—37. Weak radioactive waste storage



buses, both of them sectioned lengthwise with a breaker coupling, and supplied by two 400 kV connections in the zone, with two three-phase 400/110 kV, 250 MVA transformers. It was also intended that the entire station be operated by Cernavoda CNE personnel and exclusively for their use, without being affected by the requirements of a separate enterprise that is responsible for supplying other consumers.

The normal supply method adopted at the Cernavoda CNE for local facilities is 50 percent from the generator terminals through two 24/10/6 kV transformers, one of which is on standby, and 50 percent from the 110 kV local facility through two 110/10/6 kV transformers, one of which is on standby; all these units have a nominal power of 60/30/30 MVA<sup>11</sup>.

The intent was that the facilities could remain partially supplied in case of total failure of either of the two supplies, thus limiting major service interruptions. In addition to the connection of facility transformers supplied from the network, each pair of 110 kV bus sections will be connected to a 110/6 kV, 16 MVA transformer to supply common local services at the Cernavoda CNE.

For reasons of safety and economical land use, the 110 kV substation that supplies the exclusive needs of the Cernavoda CNE is installed indoors in a building located between generators No 2 and No 3. Each pair of 110 kV bus sections in this station also has two 110 kV lines connected to separate stations in the area. In addition to providing standby power for this station, this arrangement is also meant to provide at the station's buses the power needed to start the large motors for the Cernavoda CNE cooling pumps.

Insofar as the Cernavoda CNE has sought to standardize electrical installations for each generator, the central position of the 110 kV substation between these generators has made it possible to connect the 110/10/6 kV transformers located at the right of each generator hall with relatively short 110 kV lines, while providing 110 kV overhead cables for one of the facility transformers at generator No 2, and for both 16 MVA common local service transformers.

The four transformers, two 250 MVA and two 16 MVA, were installed along the buildings of the 110 kV facilities substation on the side facing the generator halls, so that these transformers will share with the generator and the facilities transformers a single roadway running the length of the Cernavoda CNE.

If substations have more complex connections and therefore require more land, they can be located several hundred meters from the nuclear power plant boundaries to which they belong. This approach was adopted at the Cernavoda CNE (Figure 5). The greater distance between the nuclear power plant and substation connected to the power network, often means that land features (valleys, cliffs, waterways, and so on), public

roads, or railways, are interposed between them. As the distance between the plant and its substation increases, it becomes more difficult to establish cable, control, phone, and other connections with acceptable reliability.

Technical and economic calculations for these cases have shown that for distances of about 2 km between nuclear power plants and their distribution substations, it is more economical to provide breakers for the high voltage side of the generators only at the station where the cables are connected to the network; for distances greater than 10 km, it is economical for such breakers to also be provided at the output of the nuclear power plant. Detailed analyses should be made for distances between 2 and 10 km, comparing the case of a single breaker at the system station, remote controlled by cable from the nuclear power plant, with the case of locally controlled breakers installed at the plant and the substation.

At the Cernavoda CNE, the average distance between the plant's boundaries and the substation is about 350 m, over which flows a torrential river; at the safety level required for the nuclear power plant, this river could have a flow of about 400 m<sup>3</sup>/s during torrential rains. Under these conditions, a foot bridge has been built over this river (with a second one to follow for the next bus sections) to carry electric cables between the plant and the station.

## Conclusions

Quality assurance for equipment and services has to meet nuclear construction standards only for those portions of power plants that can directly affect the nuclear safety of an area through release of radiation and radioactive effluents. This problem clearly concerns not only certain portions of nuclear power plants, but also any other industry or research laboratory whose specialty presents a risk of environmental contamination.

The available information indicates that the equipment and services of distribution substations are not subject to nuclear requirements in any of the countries that have built nuclear power plants, but are of the same quality as all other electric power facilities in the system. These findings are derived from consultations with specialists in several countries (USSR, FRG, Hungary, France), being confirmed by the fact that nuclear plant generators often deliver their power through overhead lines of 10 km or more, to substations that connect them to the electric power system, but that under these conditions the requirement for exceptional quality for the substations is compromised by the much lower reliability of line connections.



From periodic reports issued by ICEMENERG and by regional power network exploitation enterprises, it is well known that the electrical equipment produced in Romania has poor reliability, a situation that has led to the creation of permanent quality control groups assigned by MEE as customer, to the major equipment suppliers. These quality control groups carry out their activities pursuant to Law No 7/1977 regarding quality assurance at conventional industrial facilities, and have demonstrated their effectiveness in many instances; nevertheless, considering the difficulties associated with the production of electrical equipment, MEE is often placed in the position of having to accept compromises between requested delivery dates and perfect equipment quality.

There currently exists among users of transmission substations, the partially understandable conviction that the quality of equipment built in accordance with the provisions of Law No 7/1977 could be improved if it were built in accordance with the provisions of Law No 6/1982, which covers nuclear installations. This new opportunity was indeed considered by suppliers, who consequently requested cost increases of 25-30 percent per device; a more detailed analysis of these costs showed that they are in fact due to the use of higher quality materials, more careful finishing, and the rigorous quality controls stipulated by Law No 7/1977.

It is notable at the same time, that Law No 6/1982 requires neither changes in the materials and parts used for a device, nor a finish different from that used for conventional equipment; no foreign supplier would consider two types of fabrication for the same device, but only two types of verifications, insofar as verifications for nuclear equipment are performed at each execution step and recorded into control certificates with individual signatures. Based on Romania's current legislation, and in order to avoid wastes of investment funds and misinterpretations, it is stipulated that all objectives covered by Law No 6/1982 must be approved by governmental decree, approval which does not, nor should exist as a legislative expression for distribution substations.

Under these circumstances, the users of the respective investments display a complacent attitude, accepting to pay cost increases to equipment suppliers from savings achieved by completing a project more cheaply than planned, without claiming that equipment be manufactured according the provisions of Law No 6/1982, but only to obtain an unquantifiable improvement in its quality.

This attitude, which is not in the spirit of the country's laws (current provisions forbid that savings achieved in project execution be spent without special approval), is based on a private understanding of equipment suppliers in Romania, which for nuclear installations attempt to manufacture new products with different materials and finishes (equipment which ultimately should be tested as a new product), instead of providing the same device

from current production, but of suitable quality, applying detailed controls which would verify the characteristics of each material or component part consistent with approved specifications. It is only these control activities, combined with written records, that could justify a cost increase in the respective devices.

In the above situations, in the case of electrical equipment for distribution substations, pressure must be applied so that suppliers as well as the MEE quality control will become organized and perform real verifications throughout the production of materials, subassemblies, and equipment; consciousness and responsibility in carrying out these controls must be increased through motivational methods such as bonuses and fines. In this respect, the installation of equipment that meets nuclear standards in distribution substations, would violate Romania's present legislation, lead to wasted investment funds for doubtful effectiveness, and degrade the meaning of quality assurance for nuclear facility equipment and services, defeating the purpose of this special attention to such installations.

The placement of the various elements of nuclear power plants at a given site depends on the plant's specific conditions and the number of units at the site. Although it is advisable to maintain similarity (blocking) in the installation and alignment of related units, non-alignment of reactors and their generator halls is also possible in many cases (Cernavoda CNE, Bugey CNE, and others for instance). If possible, the substation for the local electrical system must be within the nuclear power plant, to be used only for this purpose; it is therefore desirable that it be located on the premises of the plant, at the core of its utilization area. The location of the power system substation is a problem associated with the power system and not with the nuclear power plant; for this reason, all nuclear power plant equipment usually is considered to stop at the generators' high voltage transformers, with the distribution substation being considered in all respects as a power system investment.

#### Bibliography

1. Burducea, C., Motoiu, C., Mingiuc, C., "Centrale nucleare electrice de putere mare" [High Power Nuclear Power Plants], Ed. Tehnica, Bucharest, 1974.
2. Boiteaux, M., "Rapport Annuel," BULL. D'INFORMATION ATEN, No 109, Sep-Oct 1974.
3. "Annual Plant Design Report Nuclear Central Stations," POWER, Nov 1975.
4. Wanke, K., "Turbogenerators for Nuclear Power Plants," TECHNISCHE MITTEILUNGEN AEG-TELEFUNKEN, Vol 59, No 1, 1969, p 1-10.
5. Leclercq, I., "L'Ere Nucleaire" [The Nuclear Era], Paris, 1986.

6. Tibal Duclaux, L., " 'China Syndrome' or 'Overload': Who is Right?", REVUE GENERALE NUCLEAIRE, No 3, 1979, p 309-315.

7. "Quality Assurance," LES NOUVELLES NUCLEAIRES, No 4, Jan 1986.

8. CSEN, "Quality Assurance Requirements for Products and Services Intended for Nuclear Facilities and Installations," Bucharest, Series AQ-04, 1983.

9. Gruener, W., "KWU 1000 MWe PWR. An Advanced Design to Meet the Needs of the International Market Place," NUCLEAR ENGINEERING INTERNATIONAL, No 3, 1986, p 30-37.

10. "New Power to Florida With Two 720 MW Westinghouse Nuclear Turbine Generators (CNE Turkey Point)," ELECTRIC LIGHT AND POWER, No 1974.

11. Rascu, P. E., "Some Major Power Problems in the Construction of Nuclear Power Plants. High Voltage Electrical Circuits. Worldwide Situation," ENERGETICA 36, 1988, No 1, p 22-32.

12. Tartanikov, V., "The Central Nuclear Power and Heat Production Plant of Odesa," ELEKTRICESKII STANTII, No 8, 1982, p 4-8. (Received on 17 November 1987, accepted on 6 January 1988)

11023

## ARGENTINA

### **Alfonsin, CNEA Head Discuss Plant Financing** *PY2408220288 Buenos Aires TELAM in Spanish* 1645 GMT 24 Aug 88

[Text] Buenos Aires, 24 Aug (TELAM)—Emma Perez Ferreira, the National Commission for Atomic Energy (CNEA) chairman, has said that President Raul Alfonsin is very optimistic about the possibility of securing additional financing to replace appropriate treasury funds in 1989 in order to continue the Atucha II nuclear power plant project.

The CNEA chairman made these remarks this morning after a meeting with Alfonsin at the Olivos residence. During the audience, Alfonsin and Perez Ferreira agreed to meet with the economic team in the next few days to review the financing of the Atucha II project.

After the meeting, which was held from 1100 to 1120, Perez Ferreira said that the economic team is now more convinced than ever of the need to complete the Atucha II project in order to cope with the electric power supply problems.

The CNEA chairman said that earlier she pointed out this fact to Economy Minister Juan Sourrouille, who had his doubts about whether this investment would be economically sound. Now, she said, he does not have any doubts. She added that for this reason Sourrouille is convinced that it will be easy to secure additional funds.

Asked about the source of the additional funds, the CNEA chairman said: I do not believe our businessmen have the financial resources to finance the outstanding amount. She added that she thinks it will be necessary to resort to foreign financing.

After the meeting with the CNEA chairman, President Raul Alfonsin had lunch with UCR presidential candidate Eduardo Angeloz.

### **Advantages of Building a Nuclear Submarine** **Cited**

*PY0609153588 Buenos Aires LA PRENSA in Spanish*  
5 Sep 88 p 8

[Miguel J. Culaciatti editorial: "The Nuclear Submarine"]

[Text] A well-known Argentine scientist has recently said that the country was going to build a nuclear engine to be used in submarines.

If we take into consideration that we have built a submarine-manufacturing plant under a German license—which so far has built nothing despite the huge sums already spent on it by the state—and that we, therefore, could build one or more submarines and equip

them with nuclear engines, we can understand the fear of some of our neighbors and of the super powers, who are alarmed by the nuclear policy adopted by our country some 20 years ago.

As soon as the scientist said we might build nuclear engines, the CNEA chairwoman immediately made it clear that the CNEA is not building any nuclear reactor for submarines, and that if it were "She would have been informed...."

The CNEA chairwoman pointed out that this type of project would cost billions of dollars which, as everyone knows, the CNEA does not have.

She also denied rumors that secret Navy funds would be used to finance the project.

What she failed to say, however, is that one of her predecessors, Admiral Castro Madero, had begun "a feasibility study" regarding the construction of a nuclear engine for submarines. According to knowledgeable sources, Adm Castro Madero has been wondering about this type of engine. Castro Madero's concern is understandable because the dream of any country's Navy is to have its own nuclear submarine.

During his administration, Adm Castro Madero authorized the use of \$90 million in the preparation of this "feasibility study." At the time of the Malvinas war, this bit of news became known to the public, and the CNEA confirmed it.

From the energy point of view, it is acceptable that Argentina becomes interested in developing a nuclear submarine. What has yet to be decided is whether or not this project is technically and economically viable and whether or not it should be considered a priority for the country's defense.

The CNEA and other national organizations may be in a position to build a small reactor to move a submarine engine but, to move this reactor we would need enriched uranium.

Does the country have enough enriched uranium to feed such a reactor?

We apparently do not have enough enriched uranium, and our possibilities of producing it in greater quantities than those required for use in laboratories seem small. Therefore, if we do build a nuclear submarine, we will have to find an enriched uranium supplier who agrees to sell us the quantity we need for a submarine.

How much would we spend on a nuclear engine?

The CNEA chairwoman mentioned \$1 billion, and she must know what she is talking about. When mentioning this amount, however, she forgot to include the equipment required to produce enriched uranium; the control

technology; the accessories required to safely operate the submarine; and a new submarine's design because the submarines we can build can only take much lighter and smaller batteries and engines.

If the technical and economic difficulties for the construction of such a submarine were overcome, we would still have to wonder whether or not this type of submarine would be worth building.

This question, however, cannot be answered on its own. It must be answered within the framework of the entire Argentine nuclear policy.

A nuclear submarine is not the same as an atomic bomb (although Adm Castro Madero said the British violated the nonproliferation treaty by using nuclear submarines in the South Atlantic war). Therefore, if Argentina builds a nuclear submarine, it will not suffer the sanctions and retaliations that it would if it detonated a nuclear bomb.

To be consistently logical, however, we would have to have a sufficient supply of nationally enriched uranium in order to think of building and operating a nuclear submarine.

During the war against the United Kingdom and its allies, the Argentine Navy claimed, in a very controversial statement, that it could not risk its ships in a naval battle against the British in view of the presence of their nuclear submarines.

Would having a nuclear submarine prevent Argentina from adopting that same attitude again?

Of course not. Such a submarine can only be effective with the tactical support of highly sophisticated communications, and only if the enemy has no air support, torpedoes, or underwater missiles, and/or nuclear weapons. All these circumstances must be added to the strategic decision of assuming the risks of a possible enemy reaction.

Although in the short term we cannot obtain the necessary electronic technology, the satellites, the torpedoes, the missiles, etc., that are used by modern nuclear submarines, the adventure of building such a submarine may prove to be rewarding. Perhaps we can build it with Brazil which has already showed interest in building its own nuclear submarine. The potential export market may prove interesting.

If we manage to build a small reactor for naval use, we may enter a trade field much more interesting than that of the unsuccessful technology "exports" that we have tried in the past. At the same time, we would be advancing toward mastering the technology of enriched of uranium, which is the only way of successfully competing in the international market.

Our country has made large investments in the nuclear area, with questionable benefits. The identical situation is that of the submarine construction plant that lies almost completely idle today.

The decision to be made depends on whether we can obtain some benefit from that investment, if this is at all possible with the current situation.

The export possibilities of the war materiel industry should not be disregarded because they can open new markets for us. The nuclear submarine project should be seriously evaluated by the government and Congress to determine if the "feasibility studies" are worth being carried forward by exploring possibilities for cooperation with Brazil or other countries.

We may not know for some time whether Argentina has completed the feasibility studies for the construction of a submarine nuclear reactor.

Low-power nuclear reactors operating on enriched uranium have already been built in the country—reactors of 5 MW or about 6,000 HP. Supposing that a submarine requires twice as much driving power, it is conceivable that a naval reactor could be built, even considering the technological difficulties posed by the small space in which it must be installed.

The manufacture of a reactor—including its controls, safety, and power—is within our technological reach. The manufacture of the submarine itself is something else, the cost of which at international prices should surpass \$1 billion.

Argentina might possibly be in the position to build a naval reactor and, perhaps, to supply it with the necessary fuel in the medium term. If so, this project might certainly yield economic and political benefits.

## BRAZIL

### Mines Minister on Nuclear Program Reorganization

PY0209024488 *Brasilia Domestic Service in Portuguese*  
2200 GMT 1 Sep 88

[Excerpts] Today in Rio de Janeiro Mines and Energy Minister Aureliano Chavez said that Eletrobras [Brazilian Electric Companies, Inc.] funds will be used first to cover the needs of the Chingo and Itaparica hydroelectric plants, and then the nuclear plant needs will be taken into consideration.

The minister said that the changes made in the Brazilian nuclear policy, which resulted in the closing down of Nuclebras and transference of the Angra I, II, and III nuclear plants to Eletrobras control, will allow a (better organization) of the country's nuclear program. Aureliano Chavez then said that whoever builds a plant must operate it. Therefore, he believes that the changes made



have been correct since Eletrobras will now be in charge of the engineering aspects and the training of plant operators. Other plant aspects will be handled by the National Commission for Nuclear Energy. [passage omitted]

The minister added that the changes will by no means affect the nuclear agreement with the FRG.

**Further on Nuclear Program Reorganization**  
*PY0609151588 Sao Paulo O ESTADO DE SAO PAULO in Portuguese 1 Sep 88 p 35*

[Text] Rio de Janeiro—None of the 5,200 employees of Nuclebras will be fired. This information was conveyed by Mines and Energy Minister Aureliano Chaves to Nuclebras President Licinio Seabra on the night of 30 August when Seabra was informed of the government's decision to close down Nuclebras.

Seabra conveyed the government's decision to his five directors at 1730 yesterday. Licinio Seabra has already been discharged by President Jose Sarney, but the details of the government decision will be revealed today in the official gazette and when Seabra meets with Aureliano Chaves, who came to Rio de Janeiro last night. The construction of the Angra II and III nuclear plants will be transferred to Eletrobras [Brazilian Electric Power Companies, Inc.]. The changes in the subsidiaries of Nuclebras are as follows:

**Nuclep** [Nuclebras Heavy Equipment, Inc.]: It was built in Itaguaí, Rio de Janeiro State, and it is the largest boiler factory in Latin America. It has the capacity to process at the same time containers [vasos de contencao] for four nuclear plants. It will produce the hull of the first Brazilian nuclear submarine. This company will be privatized.

**Nuclen**—Nuclebras Engineering, Inc.: A company for drawing up projects for nuclear plants. It designed nuclear plants for Nuclebras. It will now become a subsidiary of Eletrobras.

**Nuclemon** [Nuclebras Monazite and Associated Elements, Ltd.]: This company conducts prospecting for rare earth and monazite deposits in Rio de Janeiro and Espírito Santo States. It is a profitable enterprise, which before Nuclebras was created was under the National Commission for Nuclear Energy (CNEN) and the Brazilian Nuclear Technology Company (CBTN), the latter of which was closed down when the agreement with the FRG was signed. This company will be privatized.

**Nuclear Technology Development Center (CDTN)**: This company operates in Belo Horizonte to adapt technologies from other countries to the national situation. It will be transferred to the CNEN.

**Nuclei** [Nuclebras Isotope Enrichment, Inc.]: It produces enriched uranium, which is one of the last stages of the fuel cycle. It will be transferred to the new company Uranium of Brazil [Uranio do Brasil].

**Fuel Elements Factory (FEC)**: It operates in Rezende, Rio de Janeiro State. It makes the final fuel for nuclear reactors, and it was also designed to reprocess the fuel burned by the nuclear plants. It will be transferred to Uranium of Brazil.

**Nustep** [not further identified]: It has its headquarters in the FRG, and it is managed by the two countries. It served to transfer the jet nozzle [preceding two words in English] technology, the FRG technology for uranium enrichment, to Nuclebras. It has been closed down.

**Nuclam** [Nuclebras Mining Assistance, Inc.]: A mineral company with 51 percent of its capital in the hands of Nuclebras and the remaining percentage in the FRG. It was created to find uranium. It was not successful, and it has been closed down. The success in mining belongs to Nuclebras, which was able to increase the country's reserves from 10,000 to 315,000 tons.

**Navy Program Not Affected**

*PY0209024888 Brasilia Domestic Service in Portuguese 2200 GMT 1 Sep 88*

[Excerpts] According to Navy Minister Admiral Henrique Saboia, the reorganization of the Brazilian nuclear program is being done in order to reduce the administrative apparatus linked to this sector and, in his opinion, the measure was necessary.

The minister believes that although Brazil as of now will have a sole nuclear program, the parallel program being developed by the Navy will not be altered because the funds used for it come from the ministry's budget.

**Enrichment Process Changed**

*PY0309131988 Sao Paulo O ESTADO DE SAO PAULO in Portuguese 2 Sep 88 p 22*

[By Joao Borges]

[Text] Brasilia—The government has definitively given up all efforts to enrich uranium through the jet nozzle process in cooperation with the FRG and has decided to build a plant for the enrichment of uranium through the ultra-centrifuge process mastered by the Institute for Nuclear and Energy Research (IPEN) in the parallel project developed with the cooperation of the Navy in Iperó. According to a government source, the idea is to take advantage of the uranium enrichment plant installations in Rezende and to use them for the setting up of a new plant, but using the ultra-centrifuge process. The jet nozzle equipment will then be dismantled.

In a classified document that has served as the basis for the final discussions on the closing down of Nuclebras and the reorganization of the nuclear program, the National Commission for Nuclear Energy (CNEN) presented, among others, the following justification for the change: "In the fuel cycle sector, the impasse regarding the need for the government to decide between the jet nozzle and ultra-centrifuge processes (the jet nozzle process is expensive and has been abandoned industrially by the FRG, while the ultra-centrifuge process is totally national and industrially feasible)."

The decision to fully restructure the nuclear program with the closing down of Nuclebras and the transfer to the CNEN the responsibility to manage nuclear policy has been cloaked in extremely tight secrecy comparable only, during the current government, to the Cruzado Plan. Conducted by CNEN President Rex Nazareth with the support of the military ministers, the reorganization of the nuclear policy was reported to Mines and Energy Minister Aureliano Chaves just last week. But the minister did not know, for example, that the CNEN, tied to the Presidency of the Republic, would become the powerful organization in charge of nuclear policy. Nuclebras President Licinio Seabra was called to Brasilia last week to be informed by Aureliano Chaves about what will reportedly happen to the enterprise he was heading, but was not invited to give his opinion.

The "chronic delay" in the construction of the nuclear plants was one of the main factors in the government decision. The idea now is to install two nuclear plants to generate electricity beginning in 1993 in order to prevent the rationing of electricity in the southeastern region. Although expensive, to invest what is needed to put these plants into operation will be cheaper than beginning to build a hydroelectric dam.

#### **CNEN Chief on Policy**

*PY0609171588 Sao Paulo FOLHA DE SAO PAULO in Portuguese 3 Sep 88 p A-5*

[Text] CNEN President Rex Nazareth, 52, yesterday said that Brazil will not go back on international agreements but will have to review some contracts with the FRG now that the official nuclear program signed with that country in 1975 and the Armed Forces' parallel program have been consolidated under his supervision. He said that contacts are being maintained with the FRG through Ambassador Rego Barros. However, Nazareth did not reveal which contracts might be reviewed.

Asked about the future of the Angra II and III nuclear plants, located in Angra dos Reis municipality, Rio de Janeiro State, Nazareth said that "closer evaluation of our hydroelectric potential has indicated that we will not need many nuclear plants in the near future." In 1980, however, Nazareth favored the construction of eight nuclear plants. However, during this interview, he

affirmed that "the nuclear program must be brought into line with Brazil's needs. We cannot generate deficits and create inflationary pressures."

The CNEN president reasserted that the official nuclear program "did not fail," but that with the measures the government has just adopted, the national treasury's participation in nuclear projects will be reduced every year "based on a cost-benefit evaluation." He did not elaborate further. Nazareth said that the private sector is interested in participating in projects in the mining area, for instance, and he said: "I have talked with important businessmen."

As he was walking out of the room where the news conference was held, Nazareth said that Brazil will join Argentina in developing "fast-breeder" reactors. He had said before that Brazil intends to participate in the international fuel-cycle market, which moves resources on the order of \$11.5 billion, nearly 3.4 trillion cruzados, a year.

The CNEN president affirmed that "we are not going to export uranium ore because the market pays very little. We have to add technology to those products the world may need from us." Concluding, he noted that Brazil produces uranium for its own consumption, but he admitted that production is still on a "concentrated" scale.

#### **Eletrobras Head Comments**

*PY0609173088 Rio de Janeiro O GLOBO in Portuguese 3 Sep 88 p 17*

[Text] Eletrobras President Mario Bhering yesterday said that he will postpone the construction of hydroelectric plants in order to provide resources for the completion of the Angra I and II nuclear plants. However, he said the ongoing construction of hydroelectric plants in the southeast and northeast regions will not be discontinued.

Bhering also said that in addition to postponing hydroelectric projects, Eletrobras will increase utility rates, renegotiate debts, and seek financing from the FRG.

Bhering explained that the Sectorial Recovery Plan has earmarked \$5.9 billion in next year's budget for Eletrobras (\$2.8 billion) and Eletrobras subsidiaries in various states (\$3.1 billion).

Eletrobras will need additional resources of \$263 million in next year's budget to continue with the construction of the Angra I and II nuclear plants. It will also need \$69 million from the treasury and \$77.9 million in financing from the FRG.

"We will try to handle this radioactive hot potato," Bhering quipped.

He admitted, however, that the construction of Angra II will be delayed if the necessary resources are not forthcoming.

Bhering criticized the nuclear program installed during the Geisel government by [former Nuclebras President] Paulo Nogueira Barata, calling it "grandiose, inviable, and not self-sufficient for an enterprise like Nuclebras, which could not count on its own resources."

According to the Eletrobras president, the decision made by the government this past Wednesday was the best one possible: "It was a matter of losing the investments already made by the government or of doing what it did."

He discarded the proposition of postponing the nuclear plant projects in the current economic circumstances because doing so might definitively kill them.

However, Bhering recalled the Italian Government's decision, announced a month ago, that it was calling off four nuclear plant projects and adapting those under construction to operate on coal and natural gas: "Italy adopted that measure after calling for a plebiscite in which the people voted to dismantle the nuclear plants."

#### **New Nuclear Head on Increased Uranium Production**

PY0809025888 Sao Paulo O ESTADO DE SAO PAULO in Portuguese 7 Sep 88 p 29

[Text] Rio—At the time of assuming his position as chairman of the Brazilian Nuclear Industries, IBN, which replaces Nuclebras, geologist John Forman announced yesterday that IBN's most immediate objective is to build, jointly with the private sector, two more plants for the production of concentrated uranium (yellow cake) [preceding two words in English]. One will be built at Lagoa Real (Bahia State), and the other at Itaipu (Ceara State), where there are uranium reserves estimated at 150,000 tons. The only plant currently operating is the one at Pocos de Caldas (Minas Gerais State), where the uranium reserves amount to 20,000 tons.

The Pocos de Caldas plant, which has an operational capacity of 500 tons per year, is currently idle because the Angra I plant is not operating, and there is no other use for the concentrated uranium. Forman said, however, that IBN will begin to export concentrated uranium to allow the Pocos de Caldas plant to operate at full capacity and eliminate its losses.

According to Forman, the yellow cake market comprises European and Asian countries that do not have uranium reserves.

Brazil will be able to absorb all of its yellow cake production domestically only when the Angra II and III plants go into operation. According to Furnas Co. Chairman Camilo Pena, this will not happen for 6 or 7 years.

#### **CNEN To Use Phosphorus Technology in Uranium Enrichment**

51002032a Rio de Janeiro O GLOBO in Portuguese 1 Aug 88 p 12

[Text] Belo Horizonte—Later this year the Technological Center Foundation of Minas Gerais (CETEC) will pass on to private enterprise the technology for producing uncombined pure phosphorus and food-grade phosphoric acid. Mastery of the technology to obtain these products opens up prospects for research aimed at providing import substitutes for about 90 chemical compounds which are used in Brazilian industry and cost about \$180 million (31.1 billion cruzeiros) a year.

CETEC has been pursuing research to obtain pure phosphorus since 1975, after receiving by commodation a pilot unit donated to the UFMG [Federal University of Minas Gerais] by the National Social Development Bank (BNDES). Research, however, has been interrupted three times because of a shortage of resources.

Last year, an agreement with the National Nuclear Energy Commission (CNEN) made it possible to resume the project. According to the project coordinator, Lupericio Tarciso de Oliveira, CNEN is planning to begin research on four compounds (two derived from phosphorus and the other two from phosphoric acid) which are used in enriching uranium and are imported.

Besides bringing Brazil up to the level of developed countries which have the technology to produce pure uncombined phosphorus, CETEC's research is also innovative in terms of the methods used. For the first time wood coal is used as a reducing agent to eliminate oxygen from the phosphate concentrate, replacing the traditional coke (mineral coal). CETEC has also developed its own technology for the process of pelletizing the concentrate, the final form of the raw material going into the reducing furnace. It is a cold process using the phosphoric acid itself to convert the concentrate into pellets, in the form of a powder.

09805

#### **IAEA Official Visits Aramar Nuclear Facility**

51002032b Rio de Janeiro O GLOBO in Portuguese 21 Jul 88 p 16

[Text] The director general of the International Atomic Energy Agency (IAEA), Hans Blix, is in Brazil to assess the consequences of the accident at Goiania, among other things.



In commenting on the accident, he recalled that other similar accidents had occurred in Mexico, Morocco, and Algeria, and agreed that there were storage problems, but said that Brazil had learned from the incident.

When asked about conditions in the country for handling nuclear material, in light of the Goiania problem and the recent case of material found at Brasilia Airport, Blix again praised conditions in Brazil. He made light of the issue, saying that bombs in airports also set off alarms, and a certain amount of time is always needed to find out whether the danger is real.

Blix visited the Experimental Aramar Center where Brazil is conducting research on uranium enrichment, despite the fact that the center is not subject to IAEA safeguards. Except for Argentine President Raul Alfonsin, who inaugurated the Center together with President Jose Sarney, the IAEA director general is the only foreigner to gain access to its facilities. He was also in Rio de Janeiro, where he participated in a debate on the Goiania accident held at the National Nuclear Energy Commission. He will travel to Manaus now to inspect a project financed by the Agency.

As for the Aramar plant, Blix said that he had been informed that uranium enrichment there would only amount to 20 percent, which would rule out any possibility of using it for military purposes. After pointing out that he was not a specialist in the safety of facilities, he added that the IAEA could on request send experts to evaluate safety. He also refrained from suggesting that the Brazilian nuclear program should be subject to the Agency's safeguards, which would make it liable for inspection, arguing that this was a prerogative of the Brazilian Government.

09805

**IPEN Seeks Solution to Nuclear Waste Storage**  
*S1002032c Sao Paulo FOLHA DE SAO PAULO in Portuguese 26 Jul 88 p A-13*

[Text] The Institute for Nuclear and Energy Research (IPEN) in Sao Paulo is investigating the long-term durability of the concrete to be used in building the depository for radioactive waste and the computation codes capable of evaluating the radiological impact of the area over a 30-year period. This information was reported by the coordinator of research and development of radioactive waste management at the National Nuclear Energy Commission (CNEN), H. R. Franzem, 54. He estimates the total cost of a depository, from construction to start of operations, to be approximately \$20 million, or about 4.5 billion cruzados at the official rate of exchange.

According to Franzem, the depository would be used to store substances of low to medium radioactivity, such as the 6,000 drums of waste from the accident with a small container of cesium 137 which occurred in Goiania 10 months ago. Franzem said that in the next 20 years, Brazil will not have to reprocess combustible elements from nuclear power plants, since it will not need to confine highly radioactive waste as do other countries such as the United States, which currently has 106 nuclear reactors in operation. Brazil has only one reactor at the Angra 1 nuclear plant in the municipality of Angra dos Reis, Rio de Janeiro.

According to the CNEN coordinator, Argentina is also interested in participating in Brazil in studies on the migration of radionuclides (movement of radioactive elements), and their impact on man and the environment, in the event of a leak at the depository for highly radioactive waste.

Franzem said that this could be brought on by the formation of the earth, the effect of rain and floods. The study contains information gathered at the Complexo Industrial de Pocos de Caldas e Morro do Ferro in Minas Gerais, the largest uranium mine under exploitation at this time, capable of producing 250 tons of uranium oxide a year. The United States, Sweden, Switzerland and England are participating in the program.

The CNEN coordinator said that to store waste of low and medium radioactivity in repositories similar to the one planned by the Commission in Brazil, Spain is investing \$50 million (about 9.5 billion cruzados) to make a repository operational in 12 years, and Canada is providing \$6 million (approximately 2 billion cruzados) to be used in 1 year. Sweden has already invested \$140 million (25.5 billion cruzados) to build and operate four vaults below sea level in 30 years.

A month ago, Franzem participated in a congress on radioactive waste sponsored by the International Atomic Energy Agency (IAEA) in Stockholm, Sweden, where 26 countries were represented. He said that "there is worldwide concern" over the issue of nuclear waste and asserted that a solution to the definitive storage of radioactive waste from Goiania "depends exclusively on a political decision by the Constituent Congress." The removal of 45 drums with a capacity of 200 liters each, containing radioactive waste from Marcolio Dias Naval Hospital where the victims of the Goiania accident are housed, also depends on a political decision. The drums are at CNEN's Nuclear Engineering Institute (IEN) on Fundao Island (northern region), where, according to Suely da Silva Peres, supervisor of radiology protection, they cannot remain because of a space shortage.

09805



## BANGLADESH

### IAEA Team Urges Steps To Insure Safety From Radiation

51500230 Dhaka *THE NEW NATION* in English  
13 Jul 88 pp 1, 8

[Article by Shehab Ahmed: "IAEA May Discontinue Help if N-Safety Law Not Enacted"]

[Text] A three-member Radiation Protection Advisory Team (RAPAT) from the International Atomic Energy Agency (IAEA) which visited Bangladesh last month has suggested immediate legislations to ensure radiation safety in the country.

The RAPAT mission came to Bangladesh on a one-week visit on June 10 to assess the current status of the Radiation Protection Act, rules and regulations.

Their task was also to define immediate and future needs and formulate long-term IAEA assistance programme in terms of training, equipment and expert services for radiation protection in Bangladesh, according to informed sources.

They identified a number of areas where radioactivity needs to be regulated through legislations and suggested that before it was too late Bangladesh should do it.

The sources said, in the event of failure by the authorities to frame necessary legislations Bangladesh would find it difficult to receive help from the IAEA in future.

The RAPAT, mission comprising P. Strohal, A. Misev and K. Skornik, during their stay in Bangladesh visited the Atomic Energy Commission and its installations including the countrys lone three-megawatt nuclear reactor at Savar.

They also appraised themselves about the various applications of nuclear technology and use of radioactive substances in Bangladesh including X-ray.

Meanwhile, a draft radiation protection and nuclear safety act has been awaiting approval by the cabinet for long time.

It was placed before the government last year in the wake of import of highly radiated Polish milk powder. But it was returned to the ministry concerned to get it translated into Bangla. After translation the draft was submitted. But "red tapism" delayed its formal approval by the cabinet before it is tabled in parliament.

There had been inter-ministerial meetings, expert examinations and other procedural delays, according to informed sources.

In the absence of appropriate legislations the country faces a dangerous situation without proper controlling and regulating application of ionizing radiations.

In the industrial belts, there are quite a few cases of misuse of radioactive substances. Experts say further that the factories producing gas mantels use thorium compounds without observing any radiation protection norms thus causing unnecessary radiation exposure to the workers and the people.

Apart from the medical and industrial use, nuclear technology is also used in agriculture, food preservation including scientific research at the universities.

On top of it, the country was exposed to a potential threat of nuclear contamination when 3,000 tonnes of milk powder from Poland were imported last year by unscrupulous traders. The milk was contaminated with radioactive fallout from the Chernobyl nuclear power station disaster in the Soviet Union in April, 1986.

Although the Government ordered the Atomic Energy Commission to monitor the imports of milk powder particularly those from East Europe following the Chernobyl disaster it lacked the legal coverage to do so.

/12223

## INDIA

### External Affairs Minister on Pakistan Nuclear Program

51500229 Bombay *THE TIMES OF INDIA* in English  
23 Jul 88 p 9

[Text] New Delhi, 22 July (PTI)—Pakistan's weapons-oriented nuclear programme has assumed dangerous dimensions as it was clearly directed against India, according to the external affairs ministry.

A note, circulated at the consultative committee meeting of the ministry yesterday, says that U.S. indulgence towards Pakistan's nuclear ambitions and their efforts to strengthen Islamabad's military capability thus posed "a serious danger."

"However, India's capability to undermine that objective by strengthening itself correspondingly has apparently been underrated both by Pakistan and the U.S. and could result in a change of stance by either or both of them in a period of growing U.S.-Soviet detente."

In the final analysis the note says "Pakistan's security depends on a good, easy and cooperative relationship with India."

It was in "friendship" with India alone that Pakistan could "hope to strike a stable strategic relationship with her neighbours," the note observes.

"Will Pakistan sincerely opt for that alternative? The answer can come only from Pakistan, the note comments. India must keep nudging Pakistan relentlessly in that direction."

India feels that Pakistan's repeated violations of the recently signed Geneva Accords on Afghanistan demonstrated her intention to pursue a dangerous course on the situation there.

According to the 20-page note "Asian relations—post INF" the U.S. and Pakistan would like to see the emergence of a new government dominated by the Peshawar-based seven-party alliance.

The Soviet Union on its part would like to see a continuance of the PDPA regime or a regime in which the PDPA has substantial representation, the note said.

Only as the situation in Afghanistan progressed would Pakistan be able to achieve its long-standing aim of improving its own relations with Soviet Union in the hope of attenuating Moscow's strong ties with New Delhi.

However, Pakistan would not like this to be at the cost of its relations with Washington. Since U.S.-Pak links had acquired a security aspect which clearly placed Islamabad in the U.S. sphere of influence.

Pakistan would also seek to strengthen Sino-Pak relations "which they regard as a deterrent vis-a-vis India," the note says."

/12232

#### **External Affairs Minister Asserts Pakistan Has Bomb**

*Calcutta RAVIVAR in Hindi 6 Aug 88 p 47*

[Text] K. K. Tiwari became Minister of External Affairs during the last round of cabinet changes. What effect would it have upon the region if Pakistan has the bomb? And how would the Indian Government look upon this? A discussion with Tiwari.

[Question] After Pakistan has made a nuclear bomb, what influence will this have on the Indo-Pak relationship?

[Answer] Our policy regarding neighboring countries is absolutely clear. If there is peace and stability in our neighboring countries, then there will be here also because their people's linguistic and ethnic similarities to those of India are very great. If there are problems in Pakistan, Nepal, Sri Lanka, or Bangladesh, they fall in India's lap as thousands of people come as refugees. In some countries, however, such a mentality is being created that failing to settle their own domestic quarrels, they blame India. Pakistan is doing just this. They keep bringing India's name up in many matters. We have tried

a great deal to improve our relations with Pakistan. We want to strengthen our relationship with SAARC. Yet up to now Pakistan has assumed a negative attitude. Pakistan is accepting help from superpowers outside the region and is a toy in their hands. They take full advantage of this. They are extending their mutual quarrel. In the Simla Agreement, there was scope for the solving of every type of differences of opinion. Pakistan, however, instead of improving the mutual relationship, made every issue international and took the help of non-regional powers.

[Question] What has India done to improve relations?

[Answer] Our Prime Minister proposed to Pakistan that we adopt a mutual peace, friendship, and co-operation treaty in order to remove all kinds of doubts. Under the treaty, one of the stipulations would have been that we refrain from attacking each others nuclear centers. In order to expand mutual relations between the citizens of the two countries, writers, poets, journalists, and parliamentary members would have been sent to each others countries. But Pakistan's attitude was very negative regarding these matters. They did not accept the proposal. Pakistan is under the influence of a big super power.

[Question] Under which superpower's influence?

[Answer] Everyone knows this superpower's name. Pak is its puppet and is operating as its front line state. Pak is cooperating in all its interests. It has agreed to the building of military bases there. This brings instability to the region.

[Question] Is there any proof that Pakistan has a nuclear bomb?

[Answer] Everyone knows that Pakistan has a nuclear bomb. American intelligence also released this news and their administration has confirmed it. Pakistan in its own defense said that they haven't conducted a nuclear explosion, and that therefore the question of whether or not they have the bomb doesn't arise. The truth is that it is no longer necessary to explode in constructing a bomb. Effects can be ascertained by testing in the laboratory. Israel has never exploded a nuclear bomb, but they have at least 100. Thus it can be seen that there is no necessity of testing. The father of the Pakistani bomb, A. Q. Khan, himself said that testing is not necessary in order to make the bomb. Those who have the formula can make it. Pakistan's President Zia Ul Haq said the same thing in an interview with TIME magazine. Pakistan also says the nuclear energy they have is for peaceful purposes. The power plants in the country use natural uranium and there is no necessity for enriched uranium. My question is: Why then is Pakistan making 90% enriched uranium? It is clear that it is for making a nuclear bomb. According to the information I have, Pakistan has several bombs

[Question] America is an opponent of nuclear proliferation. Why can't they say something to Pakistan.

[Answer] This is a funny thing. America is immorally giving nuclear weapons to Pakistan. Due to this, risks to the security of the region have been created. America's law is that they cannot give economic help to nuclear countries, yet they are immorally giving \$4.2 billion of military help to Pakistan. They are constantly violating the Symington and Solarz amendments. America is such a country that it could have stopped Pakistan from making nuclear weapons, but did not. Now Pakistan is also obtaining nuclear weapon blueprints from China. These also will be used only against India. There is no necessity for use of the lethal F-16 airplanes and Harpoon missiles in Afghanistan. Yet these also have been sent. The picture is becoming quite clear.

[Question] What is India doing in response to Pakistan's making nuclear bombs and their heavy military preparedness?

[Answer] We are ready to deal with any type of attack and won't be lacking in any way. A security imbalance has been created in the region by Pakistan's having made the bomb. Now India is compelled to review its own nuclear weapons policy and see whether or not it needs to make the bomb.

[Question] But if Pakistan suddenly attacks, can we make a bomb that fast?

[Answer] Pakistan will not be so crazy as to suddenly start a fight and also use the bomb.

#### **Parliament Discusses Pakistan Nuclear Development**

51500228 New Delhi PATRIOT in English  
29 Jul 88 p 5

[Text] India's security will 'on no account' be compromised, Prime Minister Rajiv Gandhi assured the Rajya Sabha on Thursday as he intervened in question-hour on queries regarding Pakistan's reported acquisition of atomic bombs.

External Affairs Minister P.V. Narasimha Rao had told a questioner that India's own information was that Pakistan was close to or had "probably" acquired the bomb.

Mr Thangabalu and several other members in the House wanted to know the veracity of a report in an U.S. news magazine that Pakistan had acquired four atomic bombs.

Mr Rao said a close watch on the developments and the country's security interests were being kept.

At this point, Dr Narreddy Thulasi Reddy sought to know if the government was going to serve an ultimatum on the U.S. against its arming of Pakistan. To which Mr Rao said, "India had taken up the matter with the U.S., but the results have not been encouraging so far."

India, added the minister, had always pleaded that potentially nuclear states must stop their nuclear programmes and told another member, Mr Jaswant Singh, that the matter had been taken up in all its ramifications and not only from the perspective of peace in the region.

Mr Rao said there was a constant component and a variable component to any defence plans and India always kept in mind the developments in the region.

All the press reports on such issues were taken seriously by the government, though the reports could not always be depended upon, he added.

In this connection, he said that one could judge how unreliable the report was from the fact that it mentioned that India had 20 such nuclear devices.

The External Affairs Minister said bilaterally India was not being able to do anything on the nuclear issue because it was always met with a flat denial by Pakistan. So in the bilateral sphere it was very difficult to come to any meaningful dialogue on the issue, he said, adds agencies. [sentence as received]

Mr Rao said pressure was being brought from all sides to bear on Pakistan to stop its nuclear programme. India has taken up the nuclear issue in all its world wide ramifications.

On pressure being brought on the United States to desist helping Pakistan in its nuclear programme, Mr Rao said that India had been constantly telling the U.S. about it and would continue to do so. But he regretted that the results have not been encouraging so far.

Meanwhile, Mr Rao said in a written reply to another question that the U.S. Government had denied that the U.S. ambassador to Islamabad had stated in an interview that his country was proposing supply of the latest nuclear submarines to Pakistan.

Mr Rao confirmed that the U.S. was supplying Pakistan with P-3 Orion planes.

/12232

#### **Soviets To Help Set Up 2 Nuclear Reactors**

BK3108080988 Delhi Domestic Service in English  
0730 GMT 31 Aug 88

[Text] India is to set up two nuclear power reactors of 1,000 megawatts each with Soviet assistance. Based on pressurized light water, these reactors will use enriched uranium as fuel. The minister of state for science and



technology, Mr K. R. Narayanan, told the Lok Sabha today that this model is one of the safest developed in the world. It is different from the Chernobyl type. He informed the House during question time that Indian nuclear scientists are satisfied with the safety aspects and negotiations are now in progress with the Soviet Union on the terms and conditions. He said the enriched uranium to be supplied by the Soviet Union will be under the safeguards of the International Atomic Energy Agency and the spent fuel will be taken by that country.

**AEC Chairman on Plans for More Nuclear Power Plants**

51500227 Bombay THE TIMES OF INDIA in English  
19 Jul 88 pp 1, 9

[Article by L. K. Sharma: "Government Plans 10 More N-Power Plants"]

[Text] New Delhi, 18 July—Reflecting a long-term commitment to the nuclear power development strategy, the government has approved advance procurement from industry for 10 nuclear power reactors. Of these, four will be 235 MW each and six of 500 MW each.

These will be in addition to the two units each in U.P. Rajasthan, Gujarat and Karnataka, which are under implementation.

The advance sanction will pave the way for the involvement of industry which will find the prospects of larger volume of business in this high technology area attractive.

Dr M. R. Srinivasan, chairman of the Atomic Energy Commission, told this correspondent today that the department was preparing for an all-round growth in the atomic energy sector. The sanctioned programme would require expansion of uranium-mining activity, fuel fabrication facility and the establishment of a new heavy water plant.

A proposal to set up another heavy water plant at Aonola was being examined, even as work was progressing on the plants at Hazira and Manuguru. The teething troubles of the Thal plant had been largely overcome.

Dr Srinivasan did not share the general pessimism about the heavy water production programme and said most of the problems related to this extremely complex chemical process had been overcome and that was why fresh investments were being planned.

He also said the sanction for advance procurement for a batch of 10 reactors indicated that there were no misgivings about the route charted out for the development of atomic energy in the country.

Confirming the government's decision to buy a Soviet nuclear power plant, Dr Srinivasan said that soil studies at the proposed site had been undertaken and the matter was discussed with the Soviet technical delegation which visited India recently.

Dr Srinivasan said that in striking this deal, India's concerns over assured supplies and the Soviet concerns over safeguards had been taken into account. "We have learnt from the mistakes of Tarapur," he said. There would be adequate stockpile of enriched uranium for the Soviet light water reactor to avert any disruption of fuel supplies, he said.

The cost of generation in the case of the Soviet plant would be less than the cost of generation at the existing nuclear power plants.

In reply to a question, Dr Srinivasan said cooperation with the Soviet Union in this field would not adversely affect the indigenous effort. The Soviet contribution would represent an element of additionality. India had also acquired some experience in managing the light water, enriched uranium technology because of Tarapur, he said.

Asked whether the induction of the Soviet-enriched uranium-fuelled reactors would increase India's stakes in enrichment technology, Dr Srinivasan said some work on uranium enrichment was going on. Both centrifuge and laser methods were being considered, he said.

With regard to the earlier development of mixed oxide fuel, Dr Srinivasan said the knowledge gained would be useful. Also, plutonium-bearing fuel would be tried in one of the Rajasthan units. The plutonium derived from the reprocessed spent fuel mixed in a small measure would increase the efficiency of the fuel.

The recurrent problem of leakage from the end shield in one of the Rajasthan units had been brought under control for the time being, Dr Srinivasan said. The unit was being run at the reduced capacity of 100 MW and a permanent solution could be considered when the power situation improved in the state and it was possible to close the unit for replacing the end shield.

The problems related to the first fast breeder test reactor were continuing and it might resume operations in a few months. The trouble mainly relates to fuel transfer in view of the setback to the advanced fast breeder reactor in France, a leader in this technology. Commercial use of such facilities might be possible only in the next 20 to 30 years.

The design of a 500 MW fast breeder reactor was progressing well and the unit might become operational by 1997, Dr Srinivasan said.



**AEC Thorium Plant Scored for Waste Disposal Methods**

51500226 Bombay *THE TIMES OF INDIA* in English  
22 Jul 88 p 1

[Text] New Delhi, 21 July—A disaster of the magnitude of the Bhopal tragedy may occur at Ernakulam if the Indian Rare Earths (IRE), the thorium plant of the Atomic Energy Commission, fails to remove the 40,000 tonnes of thorium hydroxide stored near the Periyar river.

This warning has been sounded by the Centre for Industrial Safety and Environmental Concern, (CISEC), an environmental organisation, here.

Calling for a public debate on the case of radioactive pollution and accident potential of Indian Rare Earths that is being heard in the Supreme Court, representatives of CISEC told newsmen yesterday that the report presented by the government's expert committee was "full of lies and unscientific statements."

According to them, the committee that had been appointed by the Department of Atomic Energy under the chairmanship of Dr M. S. Valiathan, has not answered a number of queries raised by researchers. The report submitted before Justice Ranganath Misra and Justice Venkataramaiah, does not recommend the removal of thorium hydroxide and other nuclear wastes from the vicinity of the river.

According to Mr V. T. Padmanabhan, secretary, CISEC, the committee has merely found "a few imperfections here and there, but the overall finding is that there is nothing to be worried about."

The CISEC has prepared a counter report which highlights the lapses in the expert committee report and discusses the environmental and occupational hazards posed by IRE. It is scheduled for submission to the court.

The counter report also exposes the "factual inaccuracies" of the expert committee report and points out that the silo in which the 4,000 tonnes of thorium hydroxide has been stored, only a metre away from the Periyar river, has three 1-metre-long cracks through which the material has been leaking into the river.

The counter report also reveals that the underground trenches which contain 4,800 barrels of highly toxic radioactive waste are at a distance of only 10 metres from the river and are prone to leaks due to the highly acidic nature of the soil.

**AEC Chairman Discusses Nuclear Developments in India**

51500225 New Delhi *PATRIOT* in English  
24 Jul 88 p 5

[Text] Pune, 23 July (PTI)—India is expected to sign an agreement with the Soviet Union for acquisition of two units of 1000 MW pressurised light water power reactors by the end of this year, according to Dr M.R. Srinivasan, chairman, Atomic Energy Commission.

A draft inter-governmental agreement on the technical, economic, cost and other aspects of the Soviet offer was under consideration of the Union Government, he said while talking to reporters here after addressing a seminar on "nuclear power in India," organised by the Nuclear Power Corporation and Maharashtra Chamber of Commerce and Industries.

The sites for the proposed 10 more nuclear power reactors to be manufactured indigenously in keeping with the department of atomic energy's goal of 10,000 MW by the year 2000, had yet to be finalised, he said.

The Union Cabinet has approved Rs 986.75 crore for six units of 500 MW and Rs 383 crore for four units of 235 MW, he said.

Since financial sanction for the projects envisaged in the seven plan depended on selection of sites which would take some time, it was proposed to initiate advance procurement action for long delivery and critical items for these units in order to be able to maintain the planned schedules, Dr Srinivasan said.

"We have reached a stage of standardised designs and industries have become more experienced in meeting requirements of the construction of our reactors," he observed.

Dr Srinivasan, who is also secretary in the Department of Atomic Energy of The Union Government, expressed surprise over press reports which said that heavy water had been smuggled into India from European countries.

"I do not know from where they got this information," he said pointing out that heavy water was being produced in India from 1962 onwards.

Apart from Canada, only India had a remarkable capability to produce heavy water, he added.

Replying to questions, Dr Srinivasan said the Atomic Energy Commission had not "revealed" the figures of heavy water production in the country "in the national interest."

India had 70,000 tones of uranium reserves in addition to large stocks of thorium which, when used in fast breeder reactors, could produce power equivalent to that of 600 billion tonnes of coal.

Dr Srinivasan, however, added that the thorium-based system would still take some time before its practical implementation. "Work is also being started on new uranium mines," he said.

Dr Srinivasan said the country's nuclear power generation capacity was "much more" than that of Pakistan.

When his attention was drawn to Pakistan's nuclear weapons programme, he said "it is true that they have been acquiring various types of hardware from different parts of the world."

This however, he emphasised, did not mean that the countries like India, which were committed to peaceful uses of atomic energy, should go in for weapons-oriented programme.

Asked how long it would take for the country scientists to assemble a nuclear bomb if the country was forced to do it, Dr Srinivasan merely said "the country's interests will be fully safeguarded."

Earlier, delivering the keynote address at the seminar on "nuclear power in India," Dr Srinivasan said "inadequacies" in operating discipline was the main cause of the Chernobyl nuclear accident in the Soviet Union.

The USSR nuclear reactor did not have certain safety provisions which the present-day designs have, he said, adding that the Soviet Nuclear Technologists had "learnt many lessons" in respect of operational discipline after the disaster.

/12232

## TURKEY

### Tea Pulled From Market for Excess Radiation

51002457 Istanbul *TERCUMAN* in Turkish  
5 Jul 88 p 5

[Text] Bursa (ANATOLIAN AGENCY)—The "Lipton" brand tea withdrawn from the market for excess radiation reportedly registered higher than 12,000 becquerel radioactivity and is dangerous to human health.

The Republic Attorney for Yenisehir District, Bursa, brought suit against the firm that produced the tea on charges that a high rate of radioactivity was encountered in Lipton Tea. The firm's administrators will be tried in district magistrate court for "producing and marketing goods harmful to human health in violation of article 526 of the Turkish Penal Code and the Foodstuffs Code."

8349

## UNITED KINGDOM

### Government Termed Optimistic on Radiation Defense

51500238 London *THE DAILY TELEGRAPH* in English 5 Aug 88 p 7

[Article by John Grigsby, local government correspondent: "Atom Shelters Are Useless, Say Architects"]

[Text] The Government should be more honest about the danger of nuclear disasters, says the Royal Institute of British Architects.

The architects who design the power stations and the buildings expected to withstand attack warn that little is possible in the design of new buildings or in the modification of existing ones to provide significantly increased protection.

They are particularly critical of the Home Office advice on the effectiveness of garden shelters in the event of a nuclear attack.

Extracts from the £13,000 report *Nuclear Disasters and the Built Environment*, to be published later this year, are released today on the anniversary of the dropping of the first atom bomb on Hiroshima.

The report accuses the Home Office of being "excessively optimistic" about the radiation protection offered by British houses.

"It should be made clear that the improvised garden shelters, or the protect-and-survive-type refuge will only be useful in marginal or undamaged areas, and some indication should be given as to where and how extensive such marginal areas might be.

"Only in this way, we believe, will civil defence plans command the level of public support which will make them actually work and save lives."

The architects also argue that some power stations are sited far too close to heavily-populated areas. "Five power stations—Berkeley, Bradwell, Oldbury, Heysham and Hartlepool—have more than 100,000 people living within 10 miles."

The most serious accident scenario considered for Sizewell 'B' would cover an area two-thirds the size of Essex and Suffolk combined.

Although the report praises the Central Electricity Generating Board for its cautious siting attitude, it claims that the plan to build a nuclear reactor at Hinkley Point, Somerset, must be questioned. About 80,000 people live within 10 miles of it, Cardiff is only 18 miles away and Bristol 26 miles.

"Although Britain is a densely populated country, there are still opportunities for more remote sitings of new reactors, both at Dungeness and Wylfa and, as Openshaw has shown, in new locations."

/09599

### Power Systems Investigated After Alert on Magnox Reactor

51500240 London *THE DAILY TELEGRAPH* in English 5 Sep 88 pp 1, 36

[Article by Roger Highfield, Technology Editor]

[Text] A faulty fuse cut the supply of coolant to a Magnox nuclear reactor for 19 minutes.

It led to an investigation into the essential electrical power systems of all the Central Electricity Generating Board's nuclear power plants, it was disclosed yesterday.

The investigation is still going on more than a year after the Magnox incident at Oldbury nuclear power station, Gloucestershire.

The fuse fault, on June 13, 1987, resulted in a partial loss of power to instruments on one of Oldbury's two Magnox reactors. Circulation of the reactor's gas coolant—which stops the core from overheating—then failed.

It was probably the worst incident of its kind, said Dr Chris Marchese, the generating board's manager of nuclear operational services in the nuclear coordination group.

But he said that the temperature of the fuel in the reactor kept "well within operating limits," during the incident.

"There was no damage to the fuel, no radiological releases and no damage to the reactor and its components."

The incident was caused by electrical design deficiencies in a component "which had given no trouble in 21 years." Both of Oldbury's Magnox reactors have since been modified.

The type of failure, where there is a gradual loss of power, is unusual and is being investigated in the second phase of inquiry.

"We may carry out further modifications to Oldbury and to other plants," Dr Marchese said, though he emphasized it would be for economic rather than for safety reasons.

Electrical supplies have been a cause for concern before: they were highlighted in an assessment by the Nuclear Installations Inspectorate of long-term safety reviews conducted on the oldest Magnox plants.

The partial loss of the electrical supplies to Oldbury's instruments led to a number of problems including loss of water feed to one of the boilers which helps cool the reactor, instrument failure and failure of some of the reactor's control rods which vary the power of the reactor.

Because another system failed to operate there was no changeover to standby electrical supplies. And standby electrical motors used to keep the coolant gas pumping around the core of the reactor, called pony motors, were also disabled in the accident.

Nuclear engineers increase reactor safety by using redundancy, that is by backing up every critical component.

However in this case the four pony motors were disabled by a single fault, which is anathema to any nuclear plant designer.

The emergency shutdown system, which is powered by a different electrical system, shut down the reactor. Eventually the cooling of the reactor was restored manually by changing over to another standby electrical supply, said Dr Marchese.

He pointed out that the incident was less severe than a test planned at Trawsfynydd nuclear plant in Wales which had to be cancelled last February because of public concern.

The test aimed to test reactor behavior in such incidents, when cooling is lost.

Engineering calculations show that, if all the circulators used to pump coolant gas around the reactor's core had failed and water fed to the reactor's boilers was shut off, natural circulation of the coolant in the core would keep temperatures at acceptable levels.

The board has not ruled out performing the test in future, said a spokesman.

—The nuclear waste dump at Drigg, Cumbria, is being studied by land use experts in a survey aimed at protecting future generations from danger if they excavate or develop the site after the dump is full.

The survey, which is expected to last a week, is being conducted by an independent specialist firm for British Nuclear Fuels.

07310





**END OF**

**FICHE**

**DATE FILMED**

5 October 1988